

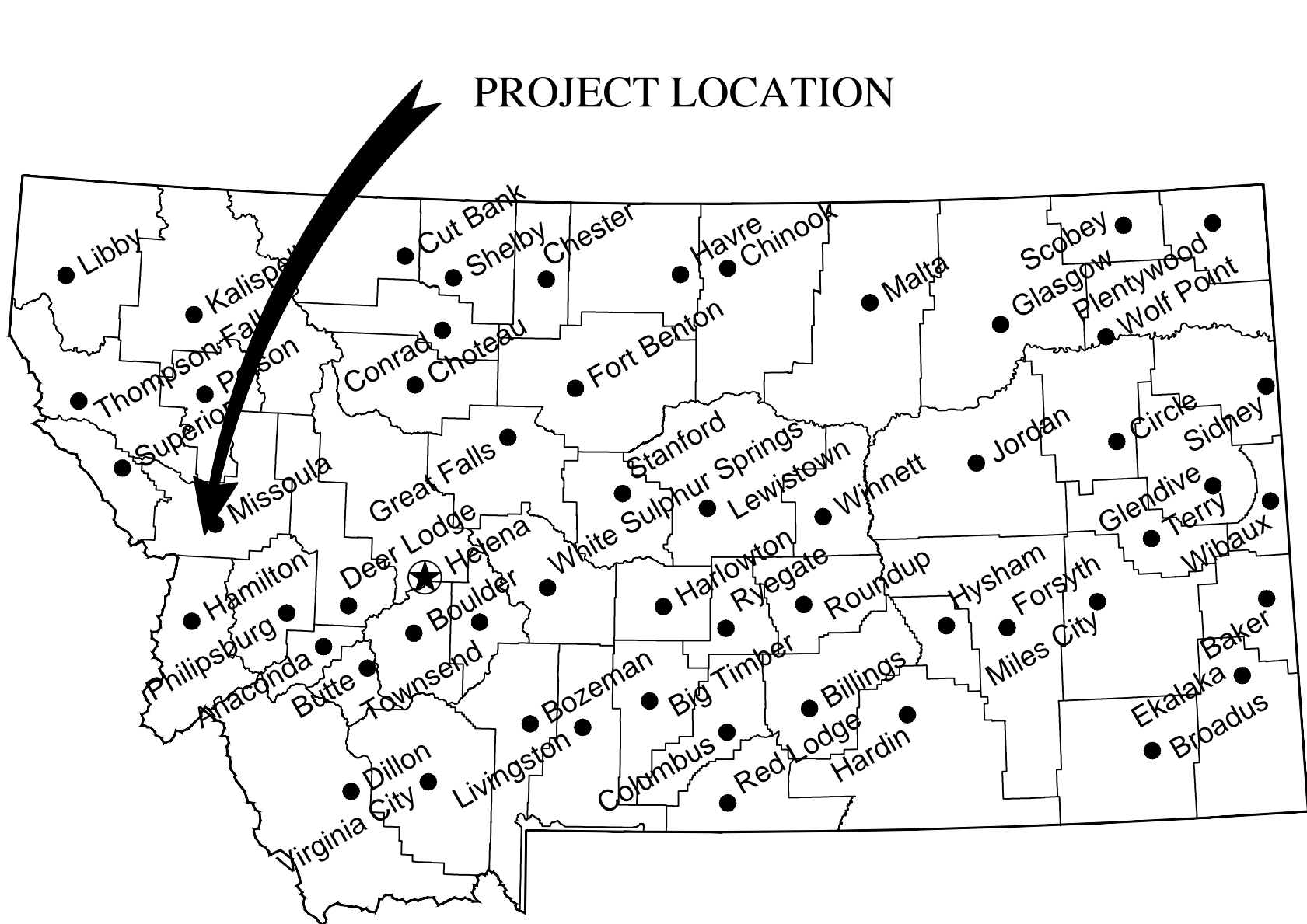
MONTANA FISH WILDLIFE AND PARKS

TRAVELER'S REST STATE PARK

PARKING IMPORVEMENTS

LOLO, MT

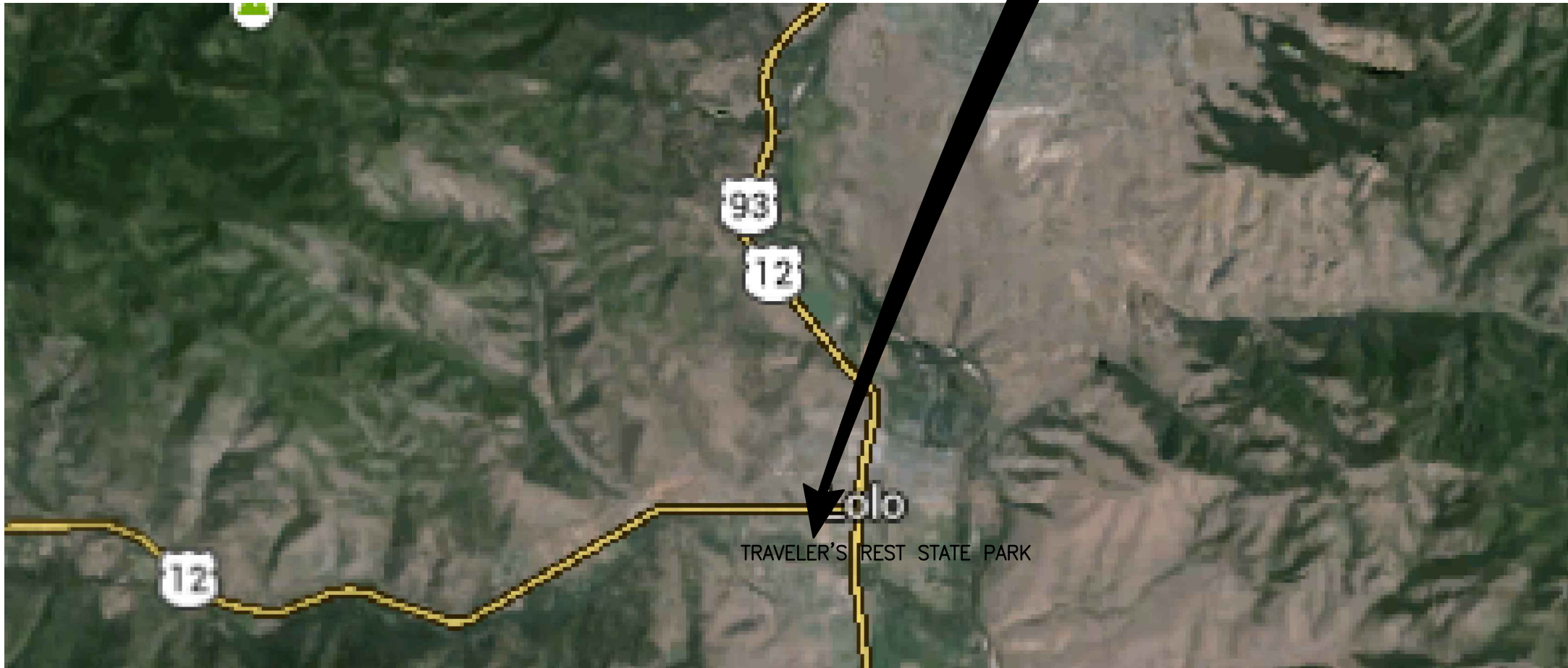
FWP#7116422



PROJECT LOCATION

Location Map

No Scale



PROJECT LOCATION

Vicinity Map

No Scale

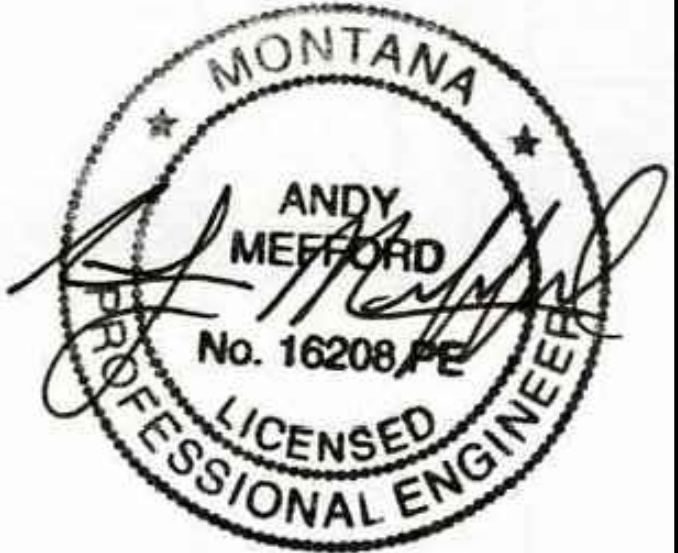
MONTANA FISH, WILDLIFE AND PARKS
DESIGN AND CONSTRUCTION BUREAU

MAILING ADDRESS:
PO BOX 200701
HELENA, MT 59620-0701
TEL 406.841.4000
FAX 406.841.4004
fwp.mt.gov/Doing Business/Design&Construction

PHYSICAL ADDRESS:
1522 9th AVENUE
HELENA, MT 59601

DRAWING INDEX

- | | |
|-------------------------------|----------------------------|
| 1. COVER SHEET | E0.0 ELECTRICAL PLAN INDEX |
| 2. ALIGNMENT PLAN AND PROFILE | E1.0 ELECTRICAL SITE PLAN |
| 3. ALIGNMENT PLAN AND PROFILE | E2.0 PHOTOS |
| 4. ALIGNMENT PLAN AND PROFILE | E3.0 DETAILS |
| 5. ALIGNMENT PLAN AND PROFILE | R3.1 DETAILS |
| 6. WEST LOOP PROFILE | E4.0 CATALOG SHEETS |
| 7. EAST LOOP PLAN AND PROFILE | E4.1 CATALOG SHEETS |
| 8. TYPICAL SECTIONS | E4.2 CATALOG SHEETS |
| 9. TYPICAL DETAILS | E5.0 ELECTRICAL SPECS |
| 10. TYPICAL DETAILS | E5.1 ELECTRICAL SPECS |
| 11. TYPICAL DETAILS | |



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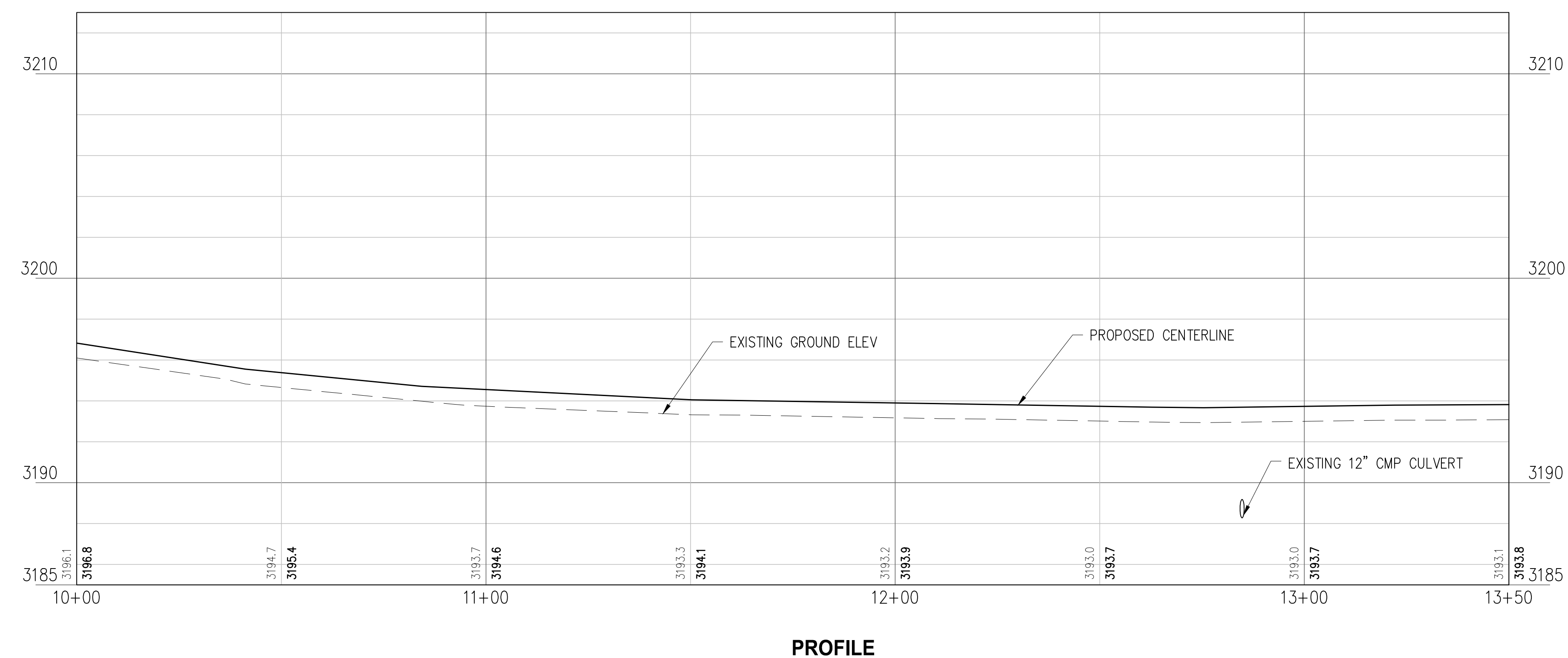
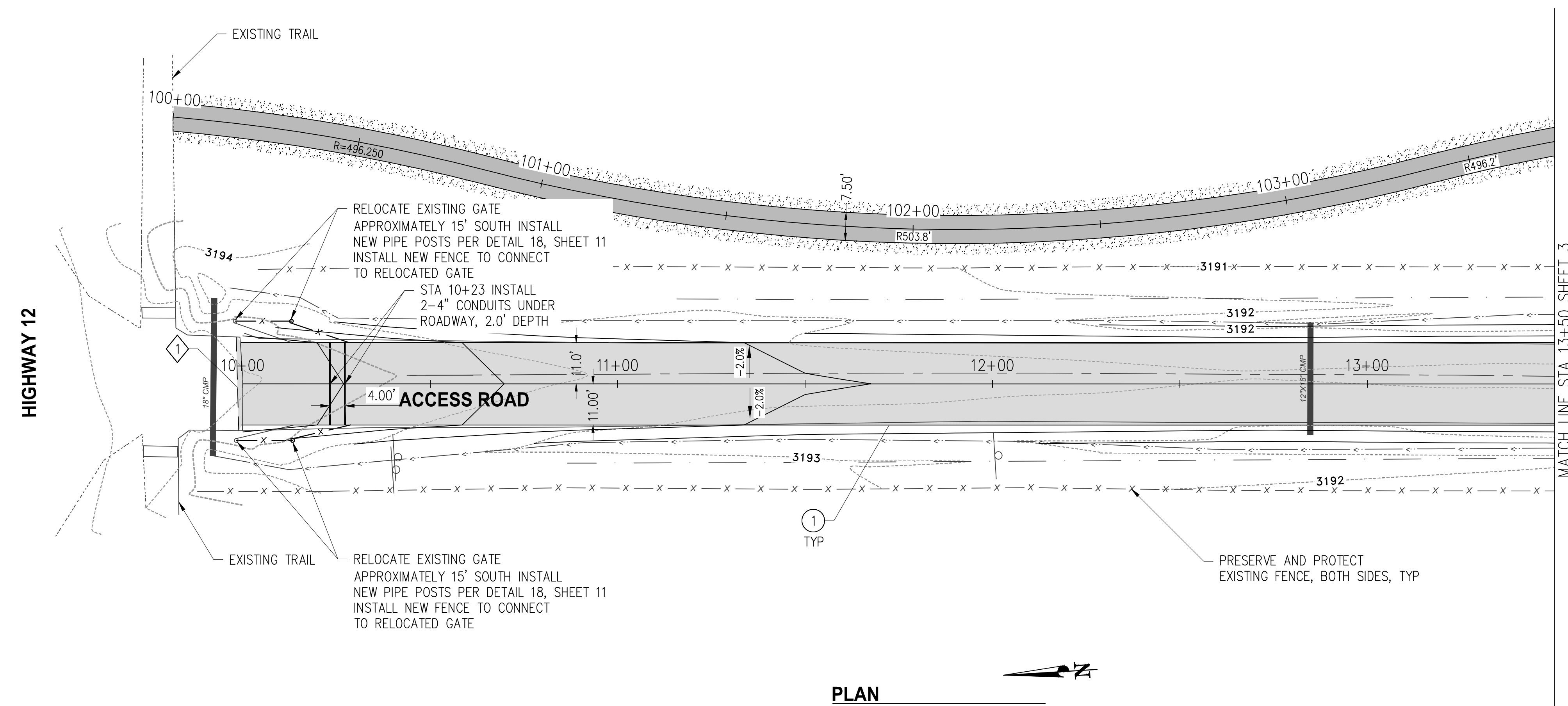
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Montana Fish,
Wildlife & Parks

TAVELER'S REST STATE PARK
PARKING IMPROVEMENTS

SHEET: 1 of 11



GENERAL NOTES

1. FOR CLARIFICATION OF THE PLAN SET THE CLEARING LIMITS HAVE NOT BEEN SHOWN ON THE PLANS. THE CLEARING LIMITS ARE TO BE MARKED IN THE FIELD AND APPROVED BY THE ENGINEER.
2. FOR TYPICAL SECTIONS & PAVEMENT DEPTHS, SEE SHEET B
3. AREAS NOT SPECIFICALLY CALLED OUT FOR RESTORATION ARE TO BE RESTORED TO PRE CONSTRUCTION CONDITION
4. ALL GRADES FOR CURB RAMPS ARE TO BE CHECKED BY THE ENGINEER PRIOR TO POURING CONCRETE, IF CONCRETE IS POURED AND THE GRADES ARE FOUND TO NOT MEET THE CURRENT ADA REGULATIONS, IT WILL BE TO THE COST OF THE CONTRACTOR TO REMOVE AND REPLACE CURB RAMPS TO CURRENT ADA REQUIREMENTS.


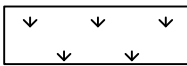
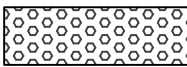


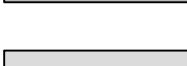
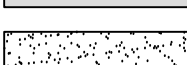





CONSTRUCTION NOTES

- ① EDGE RESTORATION PER DETAIL 8, SHT 9

DEMOLITION NOTES

- 1 SAWCUT
- 2 REMOVE CONCRETE CURB
- 3 REMOVE CURB AND GUTTER
- 4 REMOVE CEMENT CONCRETE SIDEWALK
- 5 REMOVE & SALVAGE SIGN, RETURN TO OWNER

LEGEND

- | | |
|---|---|
| | CEMENT CONCRETE CURB PER DETAIL 5 SHT 8 |
|  | CEMENT CONCRETE SIDEWALK PER DETAIL 1 OR 2, SHEET 8 AND PER MPW SPEC SECTION 02515 |
|  | PLANTER AREA |
|  | DETECTABLE WARNING SURFACE PER DETAIL 9, SHEET 9 |
|  | HMA CL $\frac{1}{2}$ " PG 64-22 PER TYP SECTION 7, SHEET 8 AND PER MPW SPEC SECTION 02510 |
|  | HMA CL $\frac{1}{2}$ " PG 64-22 PER TYP SECTION 3, SHEET 8 AND PER MPW SPEC SECTION 02510 |
|  | "ASPHALT PREP" PER TYP SECTION 4, SHEET 8 |
|  | SEEDING, PER MPW SPEC SECTION 02910 |
|  | 3", $\frac{3}{4}$ " MINUS CRUSHED BASE COURSE FOR TRAIL |
|  | SILT FENCE, PER DETAIL 17, SHEET 10 |
|  | PROPOSED FENCE |
|  | CROSSWALK PER DETAIL 10, SHEET 9 |
|  | SLOPE ARROW |

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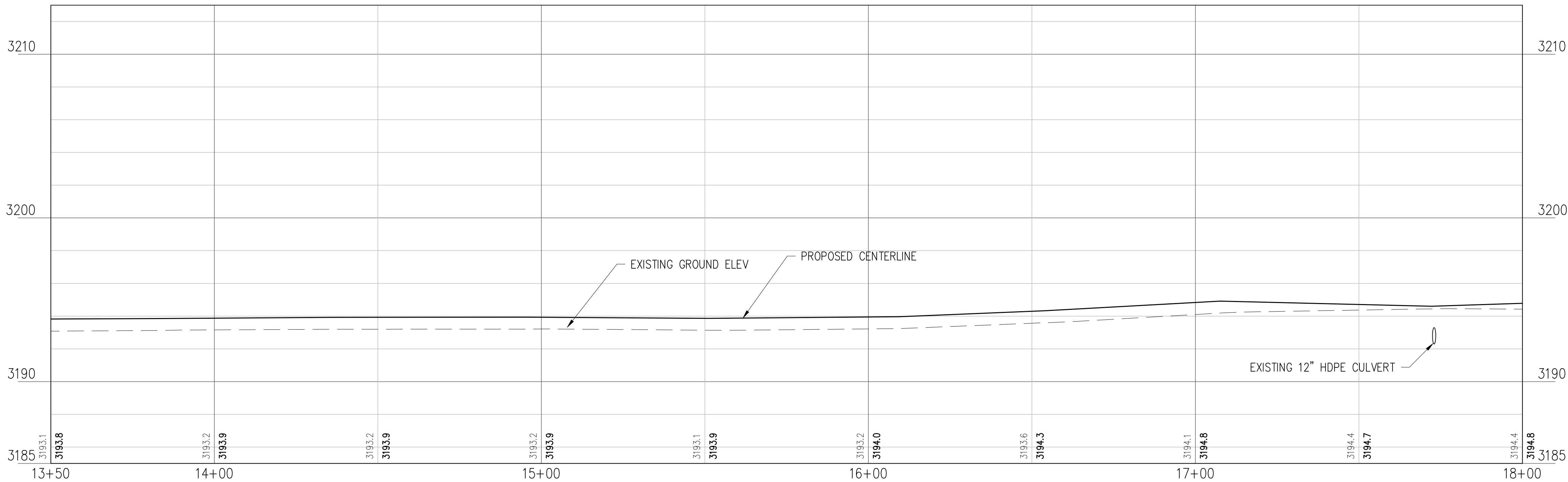
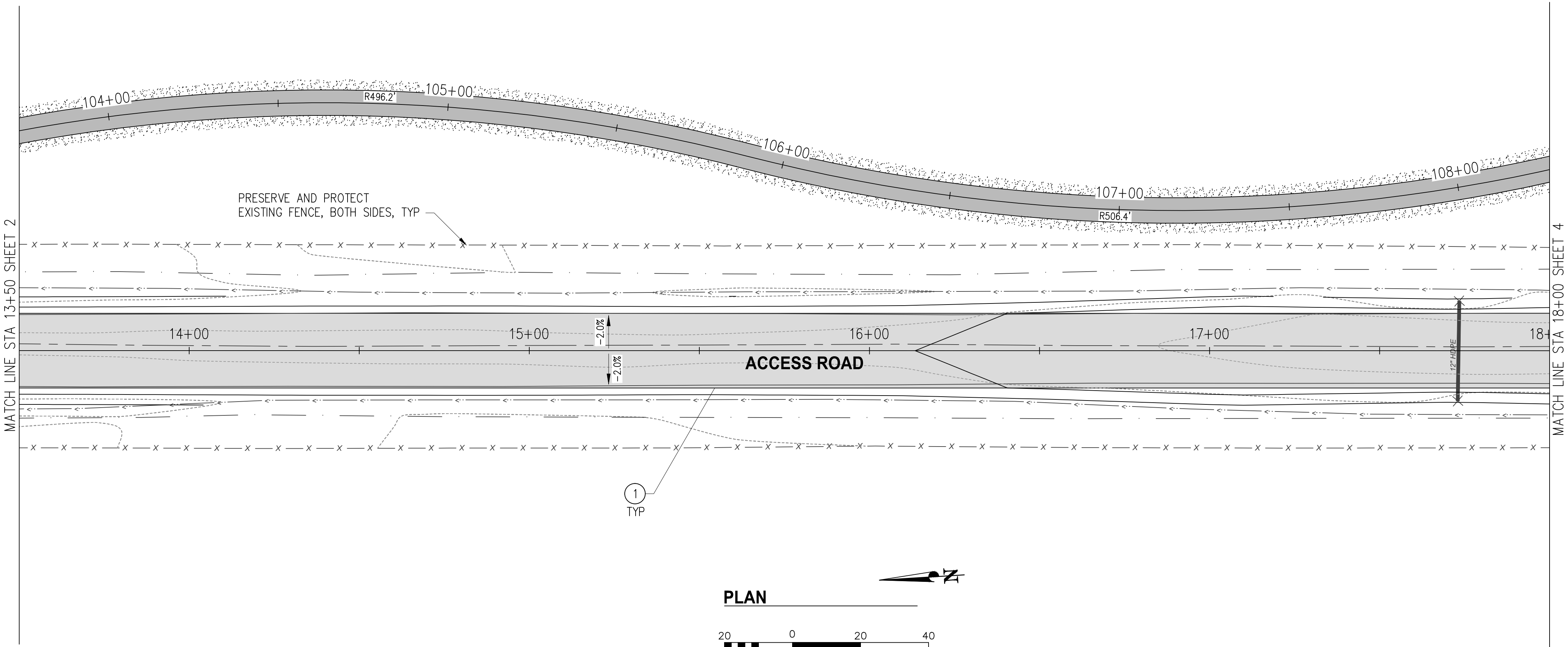


**Montana Fish,
Wildlife & Parks**

ALIGNMENT PLAN & PROFILE

TRAVELER'S REST PARKING IMPROVEMENTS

SHEET: 2
of
11



PROFILE

GENERAL NOTES

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CONSTRUCTION NOTES

- ① EDGE RESTORATION PER DETAIL 8, SHT 9

DEMOLITION NOTES

- ① SAWCUT
- ② REMOVE CONCRETE CURB
- ③ REMOVE CURB AND GUTTER
- ④ REMOVE CEMENT CONCRETE SIDEWALK
- ⑤ REMOVE & SALVAGE SIGN, RETURN TO OWNER

LEGEND

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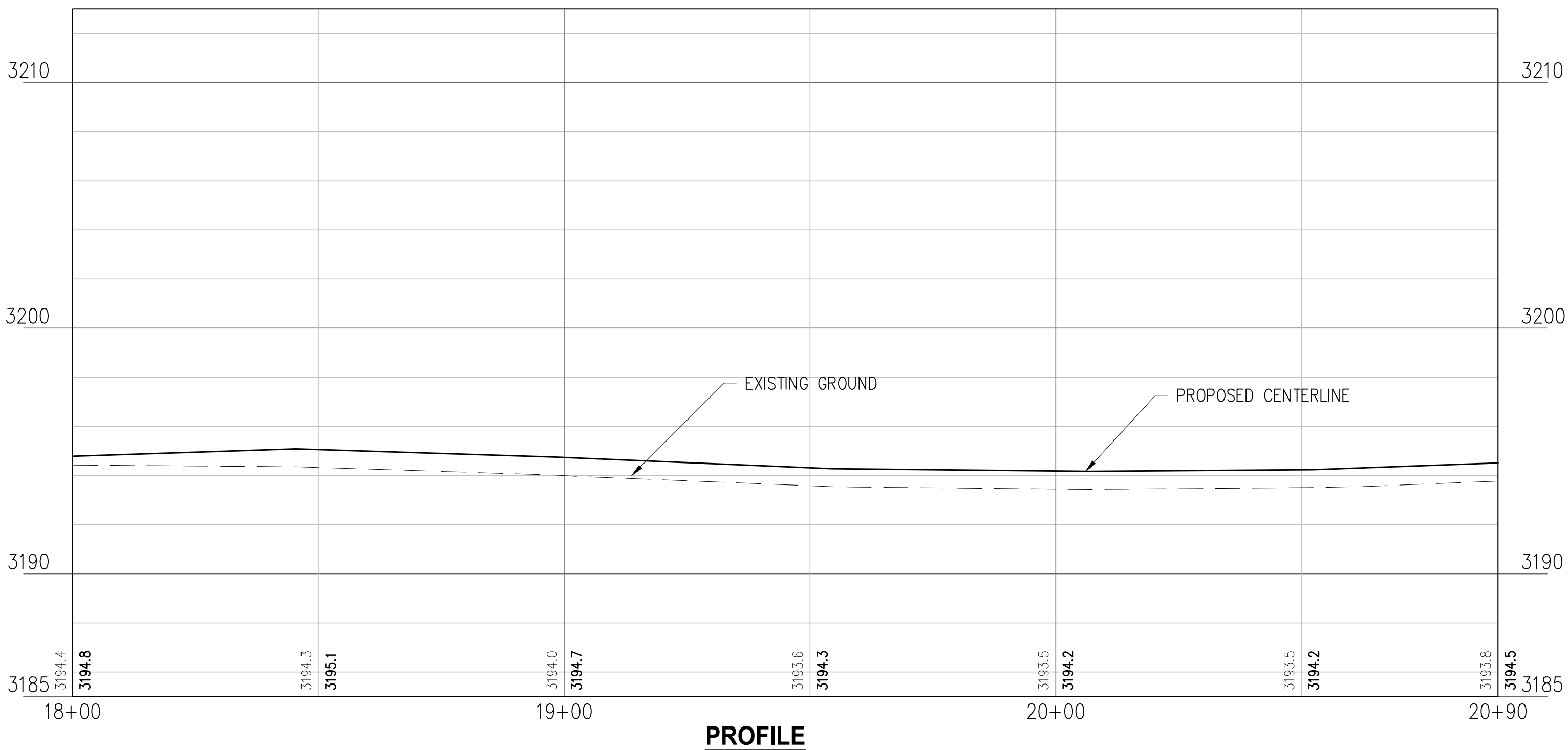
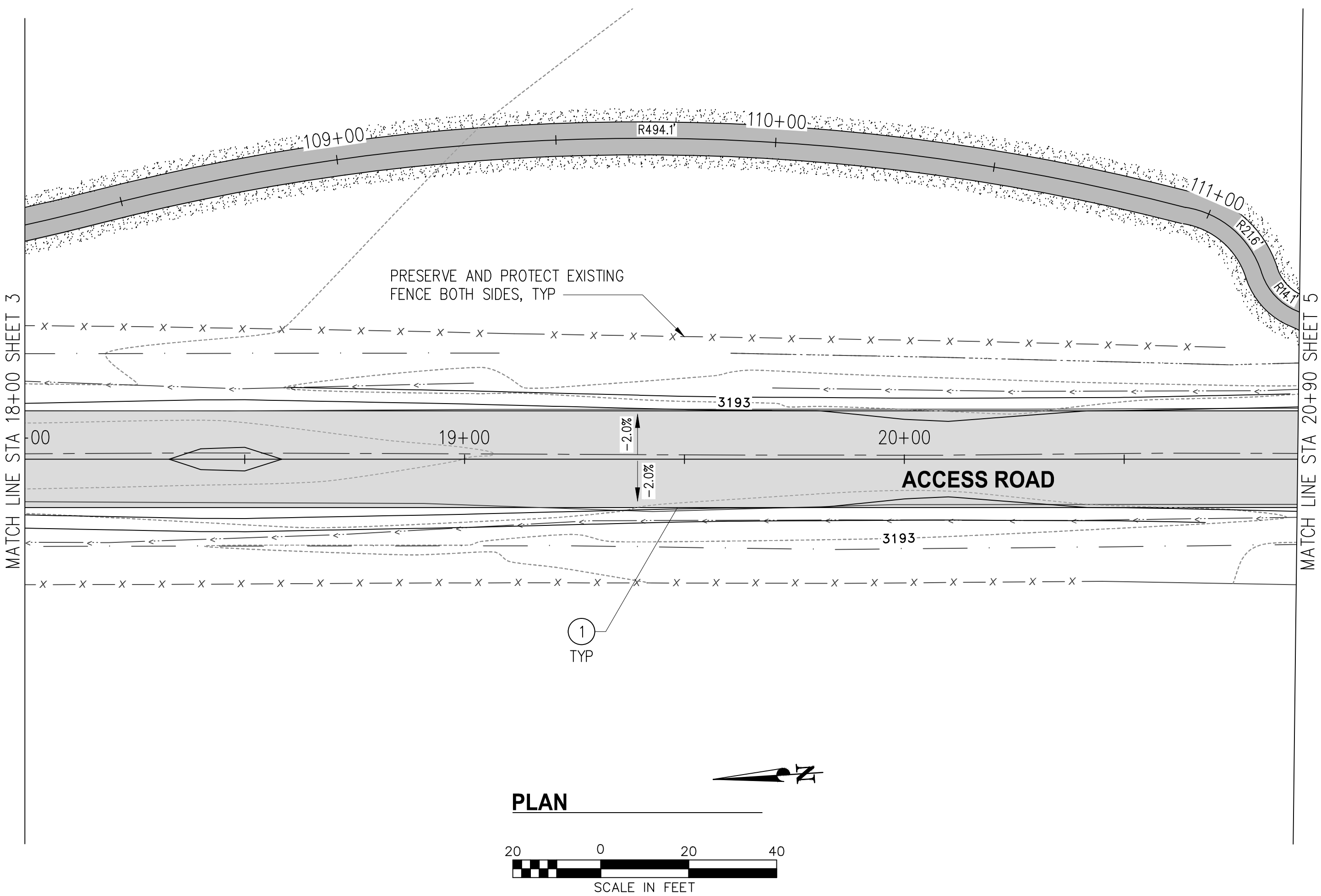
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Montana Fish & Wildlife & Parks

ALIGNMENT PLAN & PROFILE
TRAVELER'S REST PARKING IMPROVEMENTS

SHEET: 3 of 11



GENERAL NOTES

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PROPOSED FENCE
CROSSWALK PER DETAIL 10, SHEET 9
SLOPE ARROW

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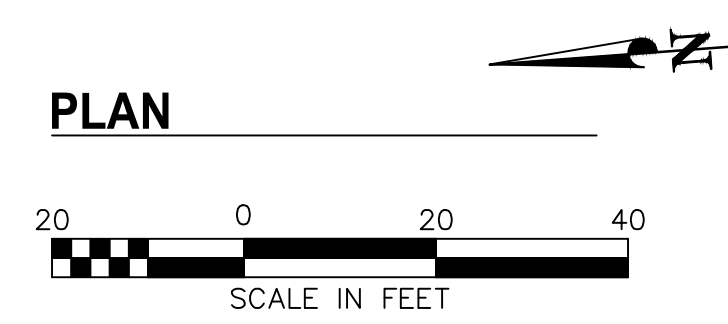
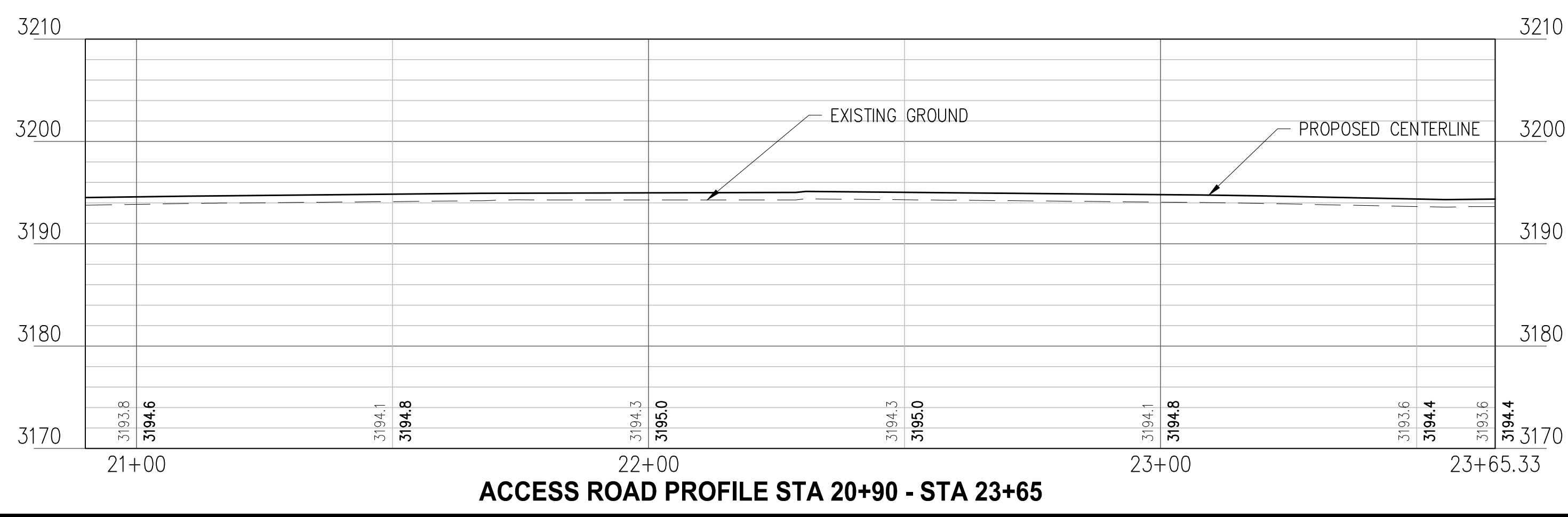
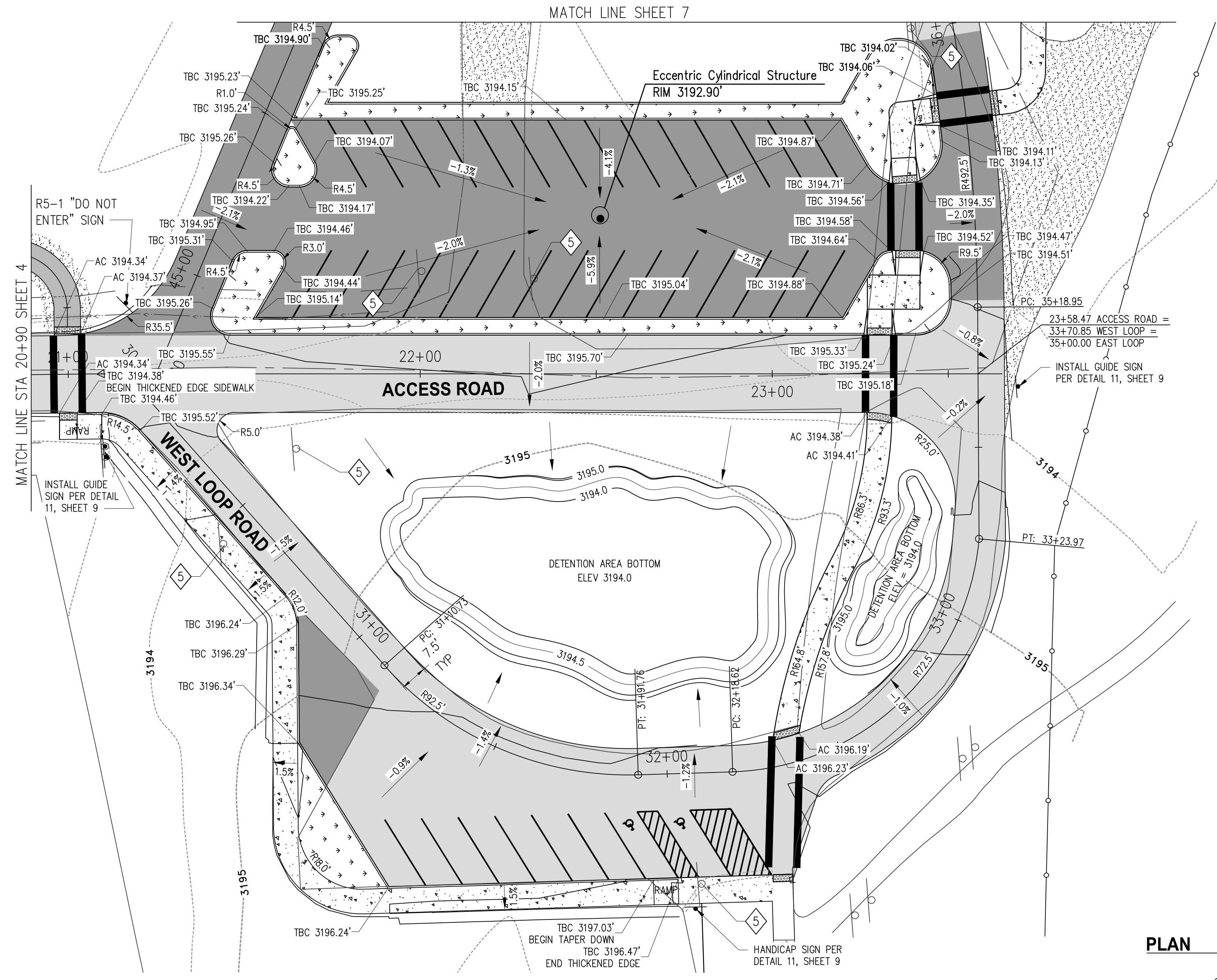
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Montana Fish,
Wildlife & Parks

ALIGNMENT PLAN & PROFILE
TRAVELER'S REST PARKING IMPROVEMENTS

SHEET: 4
of 11



GENERAL NOTES

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CONSTRUCTION NOTES


- ① EDGE RESTORATION PER DETAIL 8, SHT 9

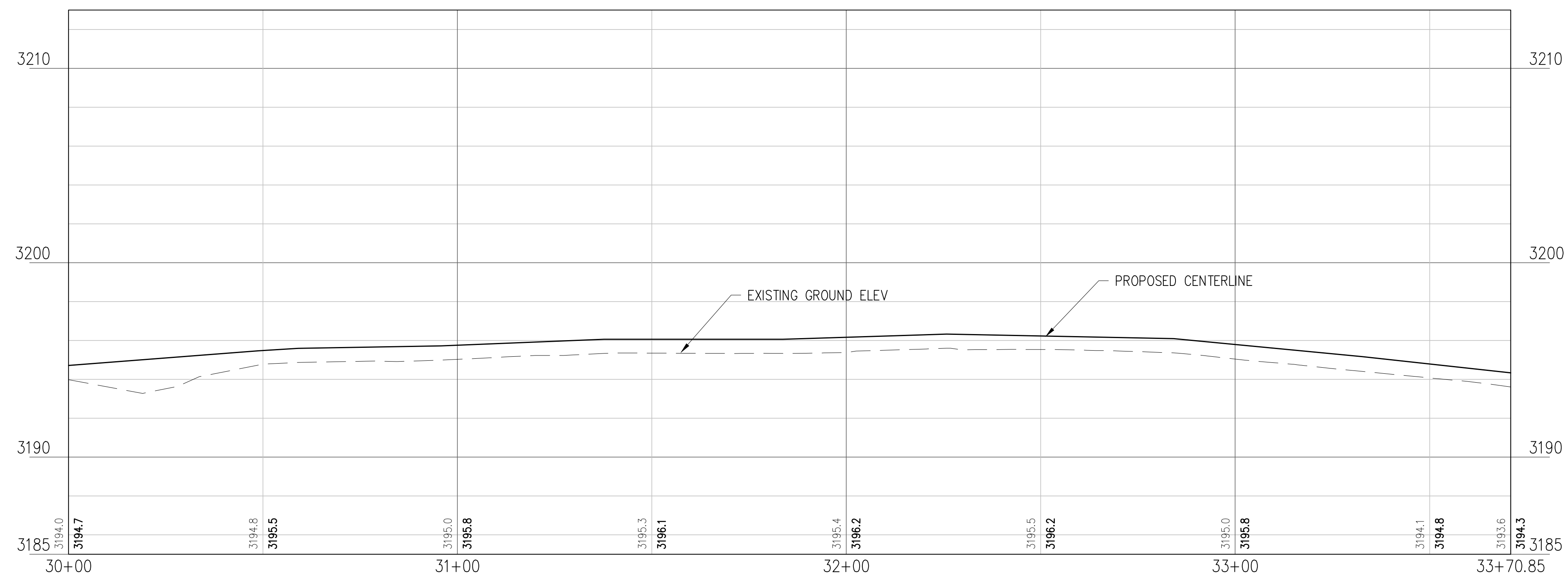
DEMOLITION NOTES

- ① SAWCUT
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- ④ REMOVE CEMENT CONCRETE SIDEWALK
- ⑤ REMOVE & SALVAGE SIGN, RETURN TO OWNER

LEGEND

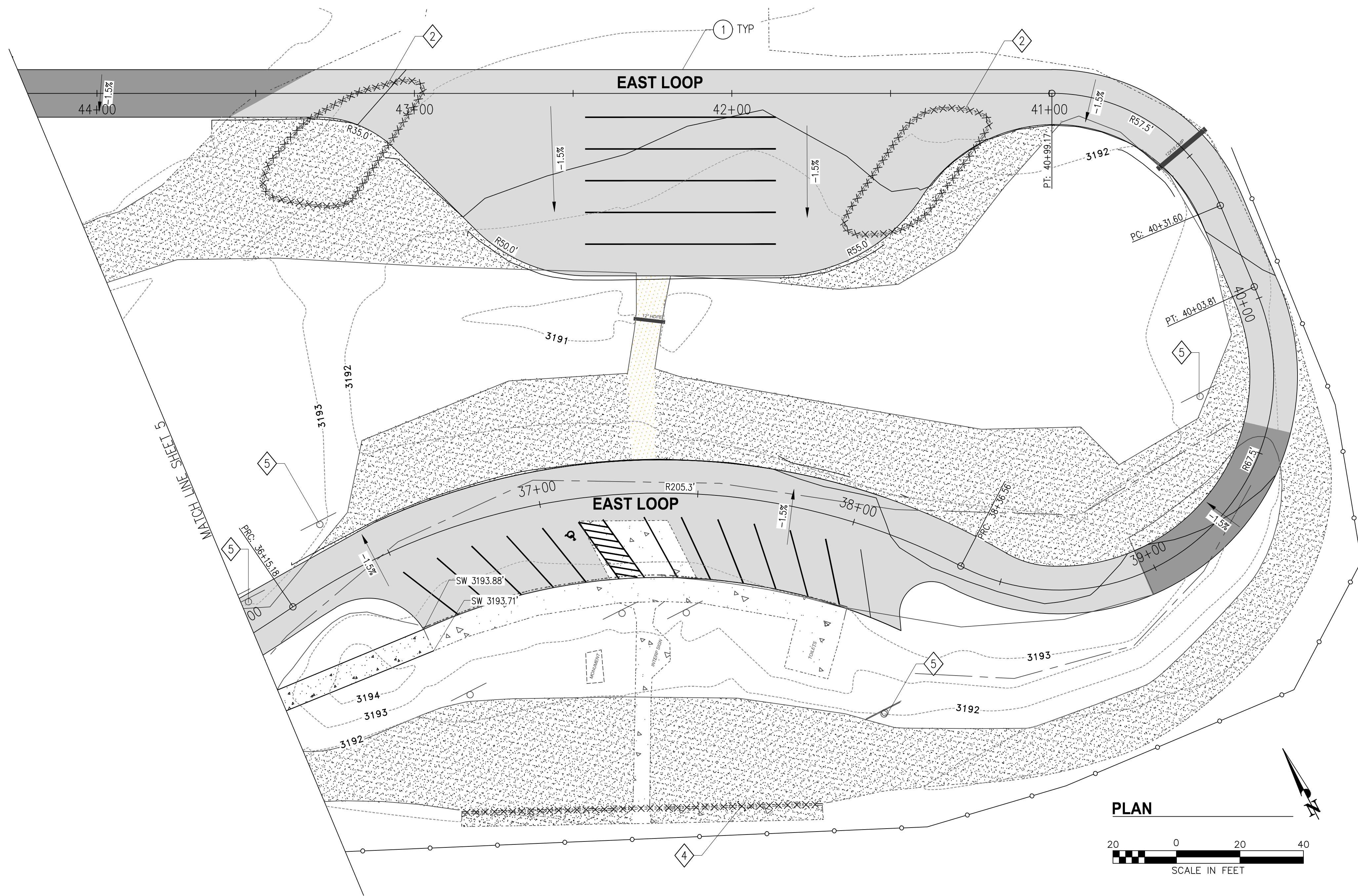
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ACL DRAWN BY: DATE: 12/2013 CHECKED BY: DATE: ----	APPROVED BY: DATE: ---- APPROVED BY: DATE: ----	APPROVED BY: DATE: ---- APPROVED BY: DATE: ----	 Montana Fish, Wildlife & Parks	ALIGNMENT PLAN & PROFILE TRAVELER'S REST PARKING IMPROVEMENTS	SHEET: 5 of 11



WEST LOOP PROFILE

ACL DRAWN BY: _____ DATE: 12/2013 CHECKED BY: _____ DATE: _____	APPROVED BY: _____ DATE: _____ APPROVED BY: _____ DATE: _____	APPROVED BY: _____ DATE: _____ APPROVED BY: _____ DATE: _____	 Montana Fish, Wildlife & Parks	WEST LOOP PROFILE TRAVELER'S REST PARKING IMPROVEMENTS	SHEET: 6 of 11
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CONSTRUCTION NOTES

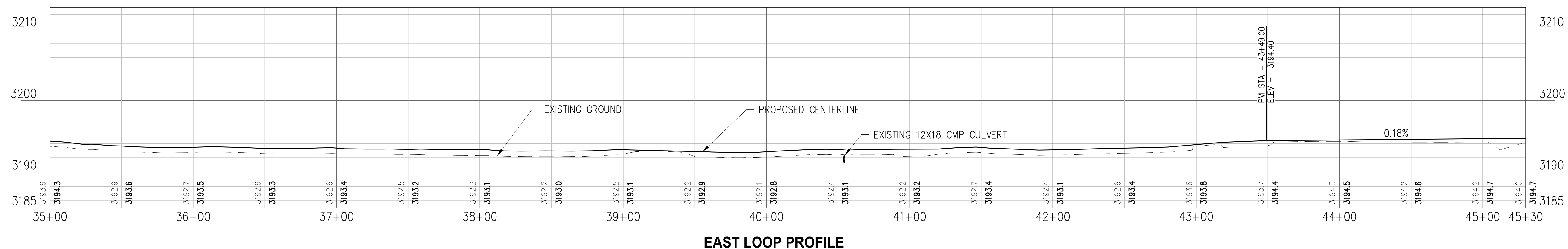
- EDGE RESTORATION PER DETAIL 8, SHT 9

DEMOLITION NOTES

- SAWCUT
- REMOVE CONCRETE CURB
- REMOVE CURB AND GUTTER
- REMOVE CEMENT CONCRETE SIDEWALK
- REMOVE & SALVAGE SIGN, RETURN TO OWNER

LEGEND

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EAST LOOP PROFILE

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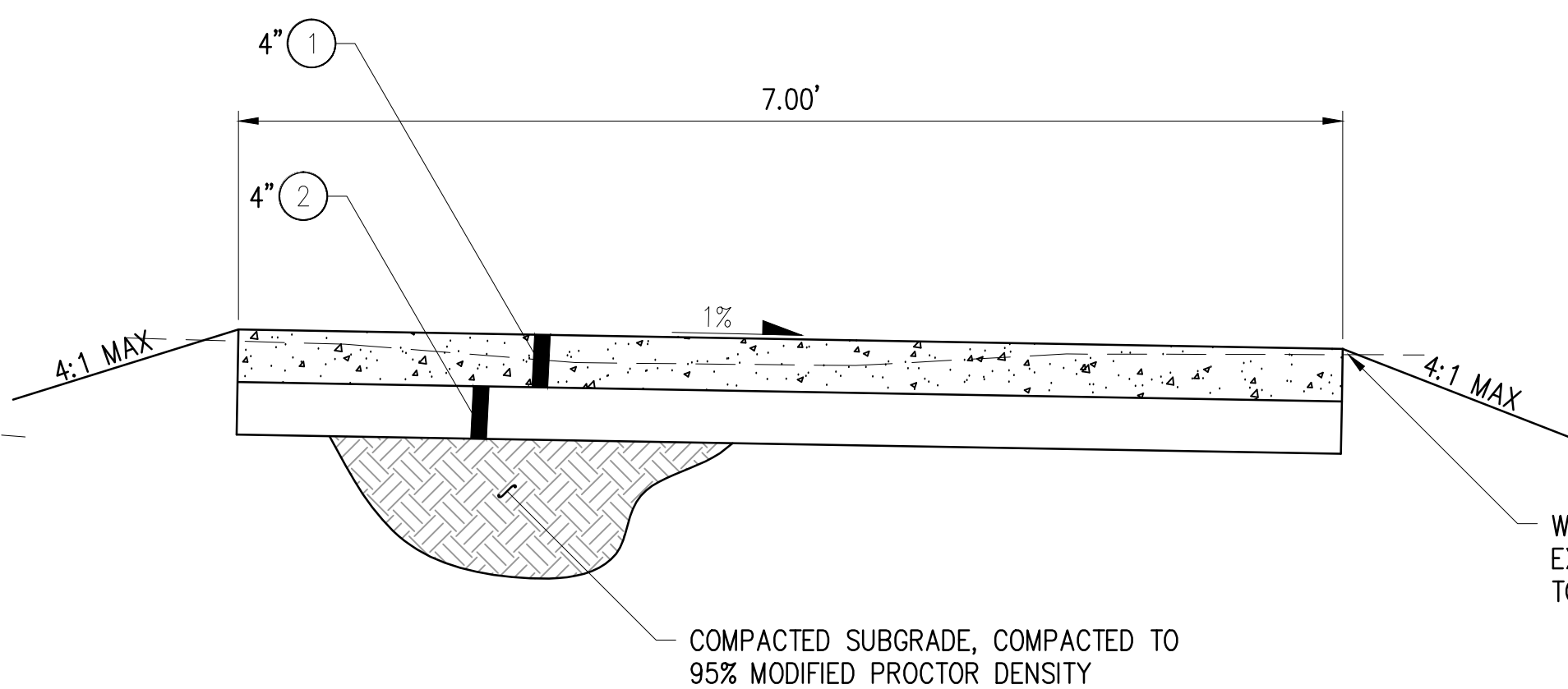
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**Montana Fish,
Wildlife & Parks**

EAST LOOP TRAVELER'S REST PARKING IMPROVEMENTS

SHEET: 7
of 11



MATERIAL CODE	
①	CEMENT CONCRETE SIDEWALK
②	CRUSHED BASE COURSE ¾" MINUS
③	CEMENT CONCRETE TYPE "B" CURB
④	HMA TYPE B
⑤	CRUSHED BASE COURSE 3" MINUS
⑥	TOPSOIL

TYPICAL SIDEWALK SECTION

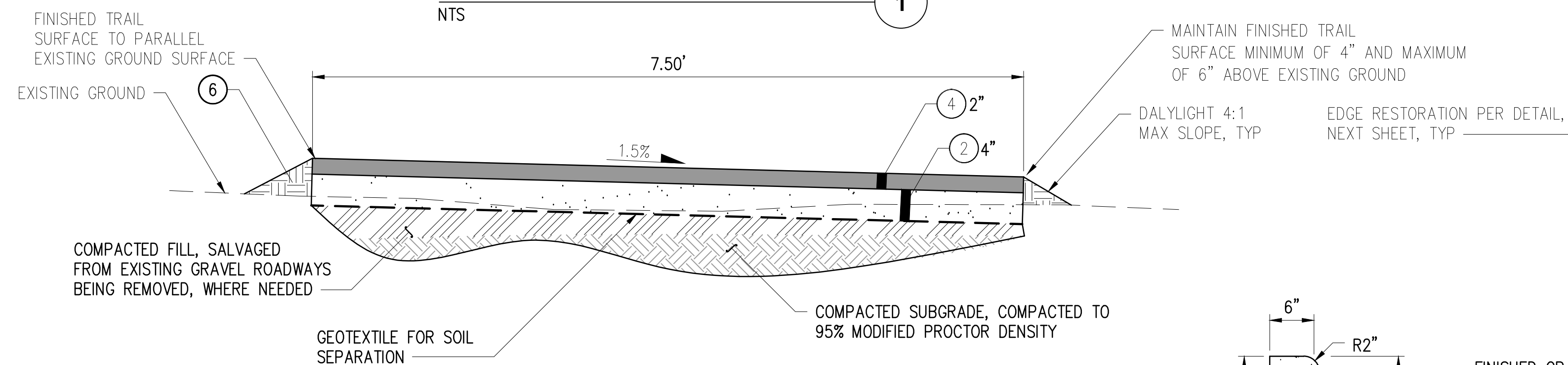
1. WHERE REQUIRED THE CONTRACTOR IS TO PROVIDE FILL MATERIAL TO BRING SUBGRADE TO BOTTOM OF CRUSHED BASE COURSE. THE FILL MATERIAL SHALL CONFORM TO SPEC SECTION 02235

VARIES
SEE PLAN SHEET 2-7

VARIES

2.5"

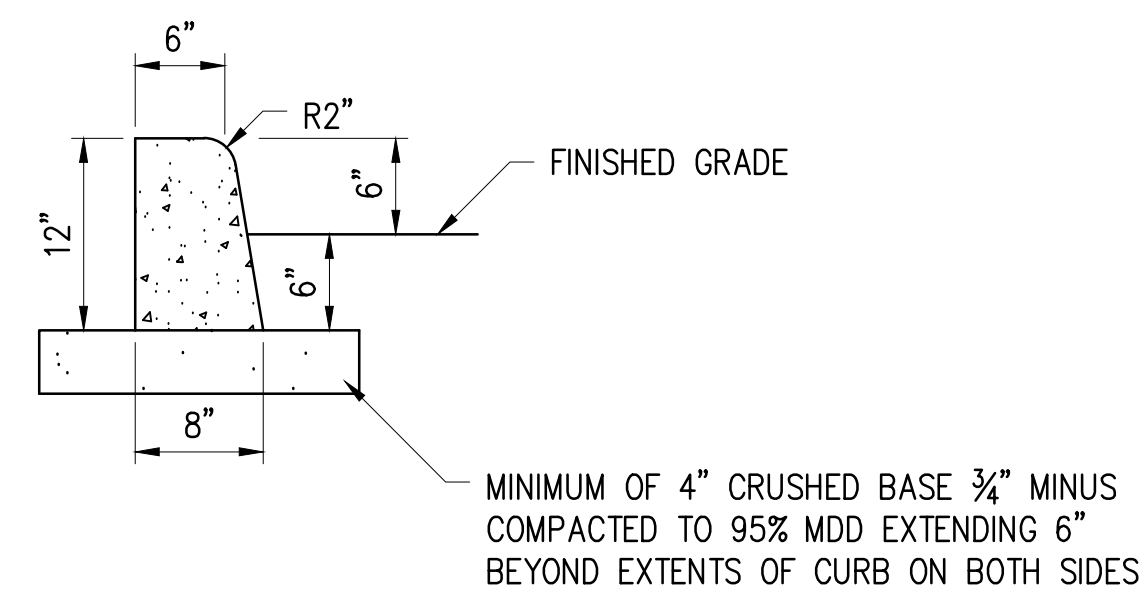
1"



TYPICAL TRAIL SECTION

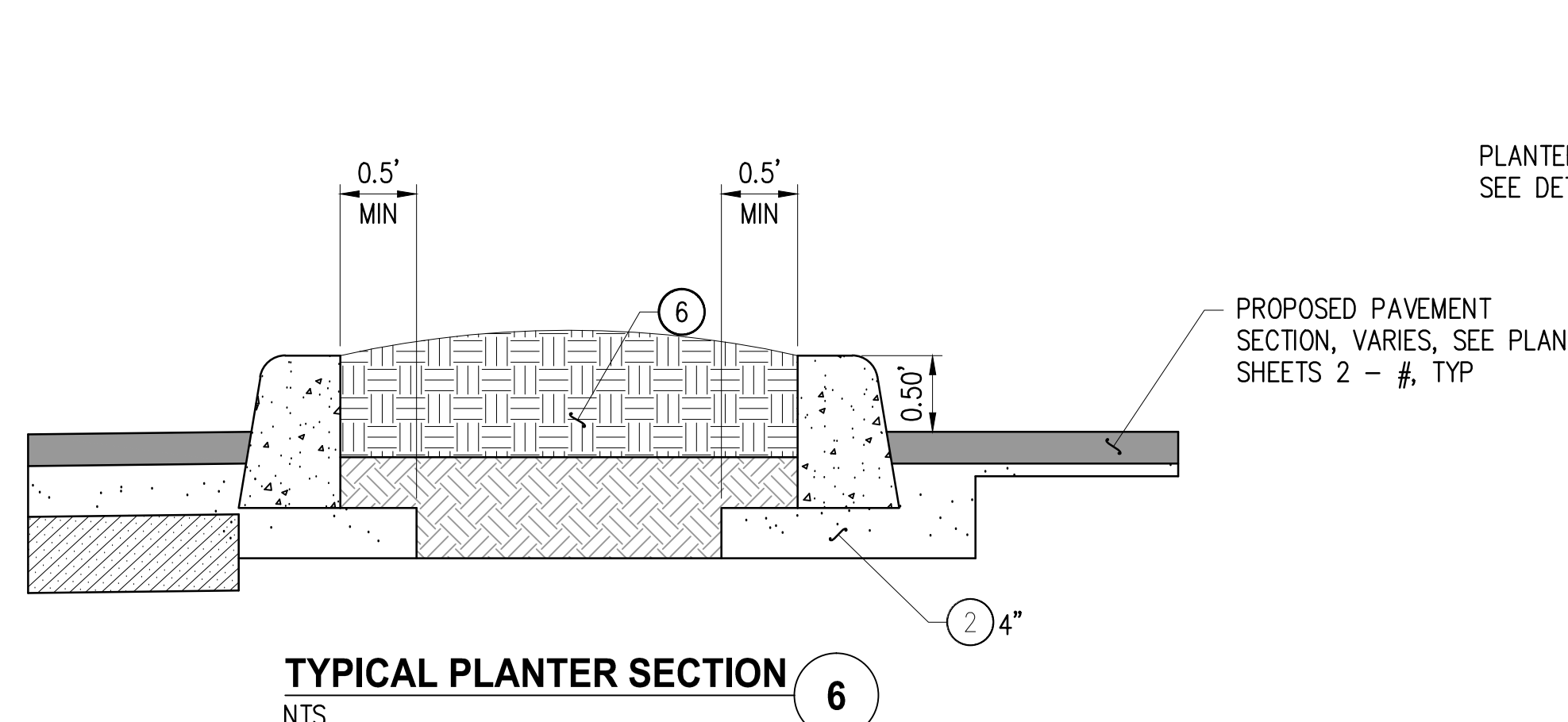
ROADWAY PREP SECTION 4

— EXISTING GRAVEL ROAD,
TO BE PREPARED FOR PAYMENT

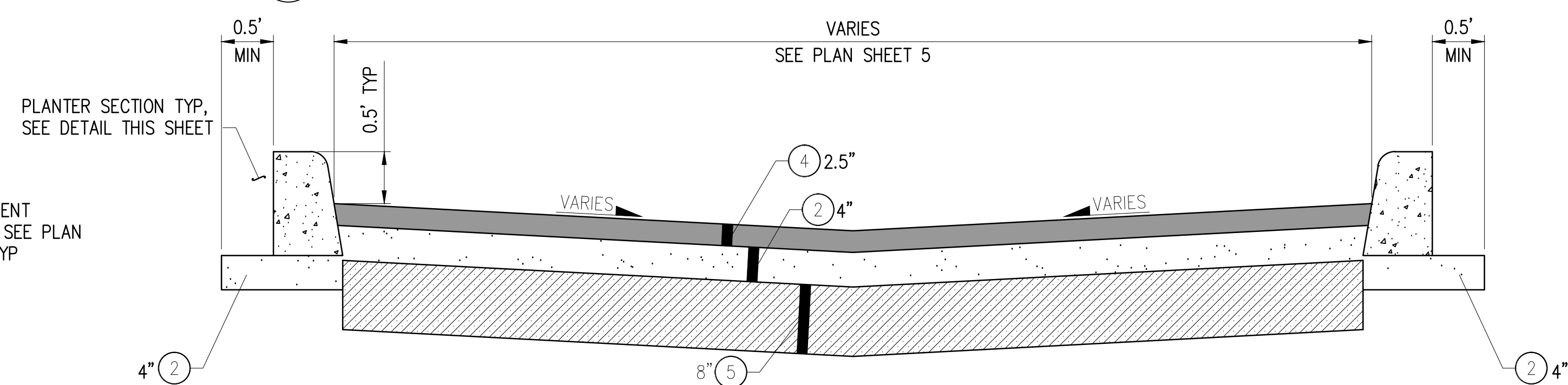


TYPICAL B CURB SECTION 5

NT



TYPICAL PLANTER SECTION 6



NEW PAVEMENT & TYPICAL PARKING SECTION SECTION 7

NTS

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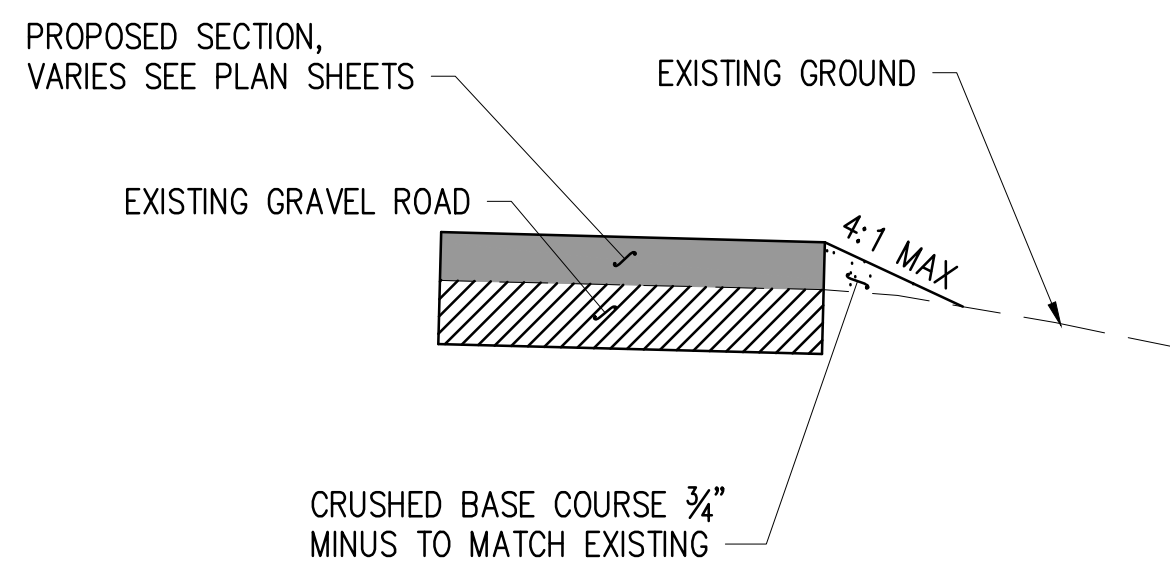


**Montana Fish,
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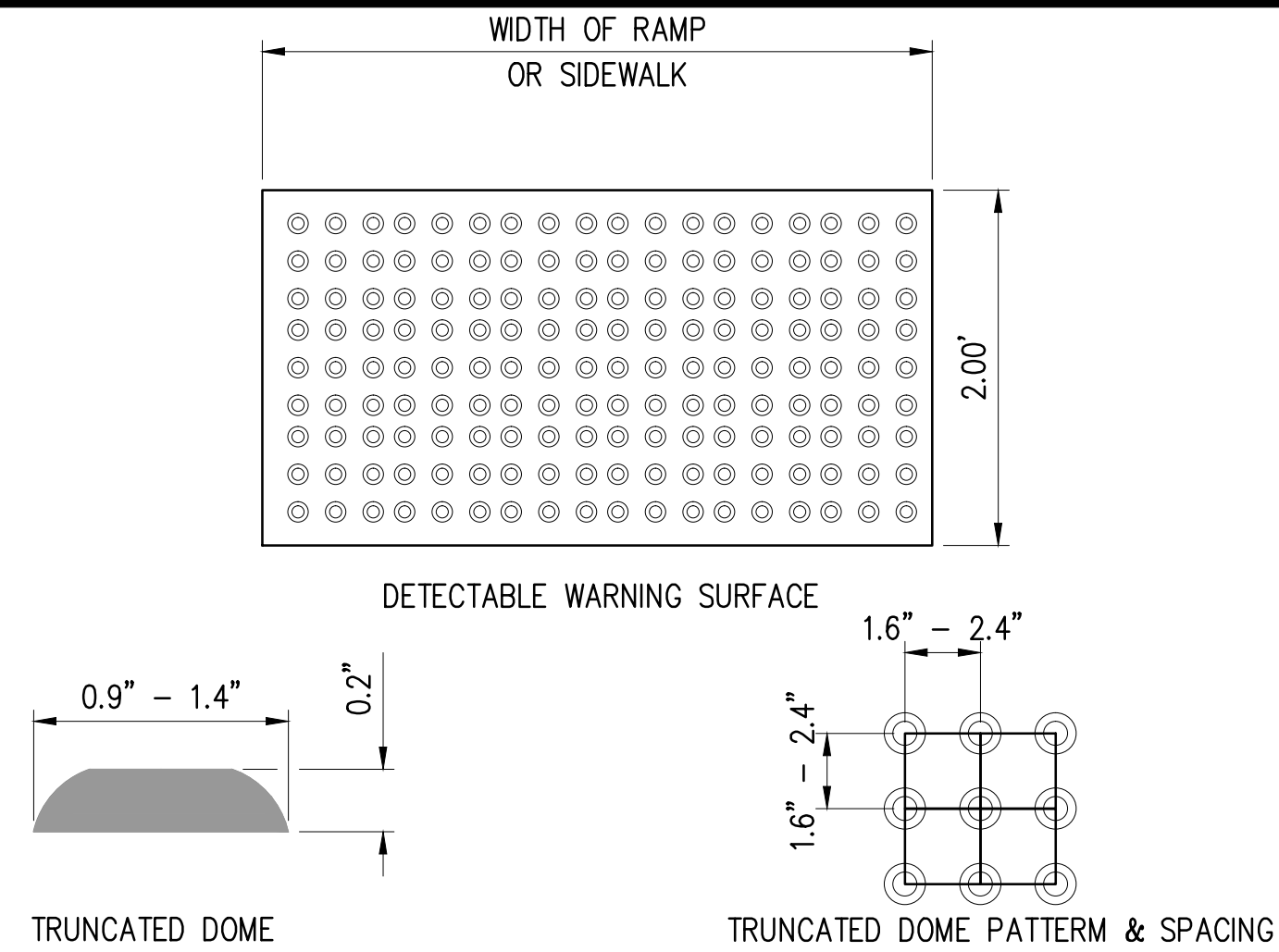
TYPICAL SECTIONS

TRAVELER'S REST PARKING IMPROVEMENTS

SHEET: 8
of 11



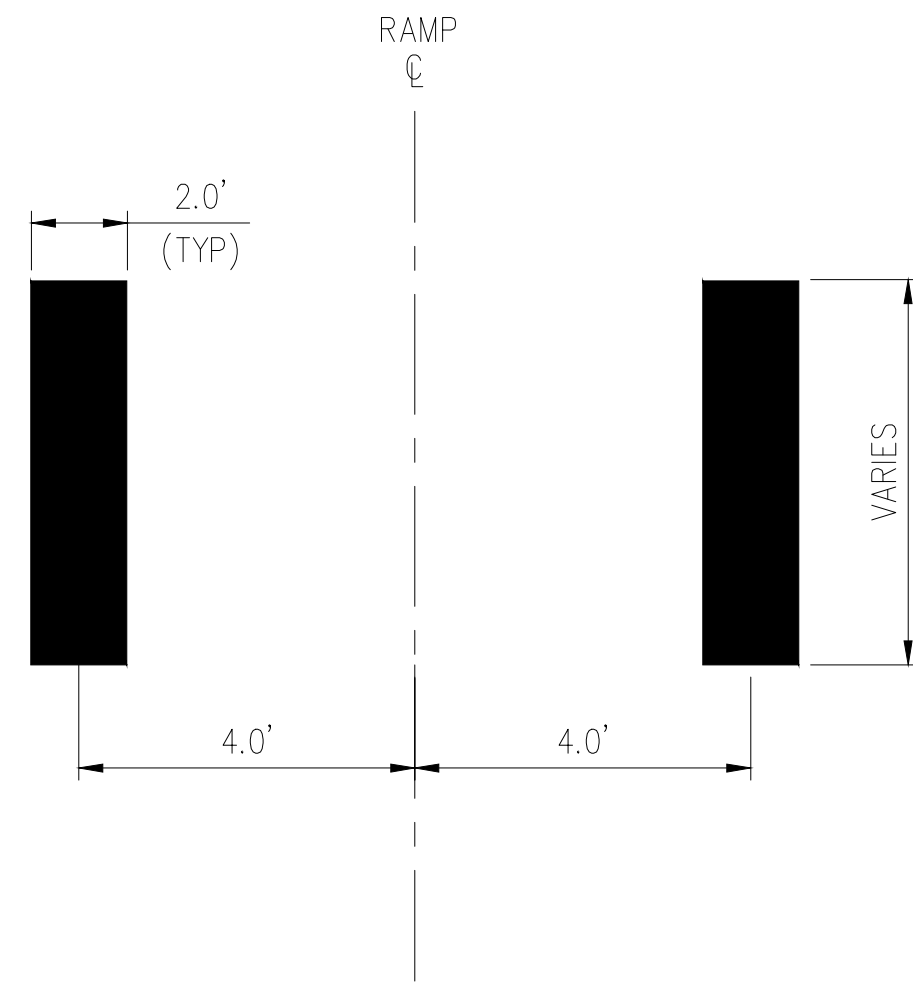
EDGE RESTORATION DETAIL 8
NTS



GENERAL NOTES:

1. DETECTABLE WARNING SURFACE (DWS) IS COMPLETELY TO COMPLY WITH ALL CURRENT ADA REQUIREMENTS
2. DWS MATERIAL SHALL BE CAST IRON
3. DWS PANEL SHALL BE PLACED TO MATCH GRADE OF SIDEWALK/RAMP AND MAY NOT EXCEED 8% GRADE AND 2% CROSS SLOPE
4. DWS PANEL SHALL BE PLACE PERPENDICULAR TO DIRECTION OF PEDESTRIAN TRAVEL
5. COLOR SHALL MEET THE MINIMUM CONTRAST REQUIREMENTS

TRUNCATED DOMES DETAIL 9
NTS



CROSSWALK LAYOUT DETAIL 10
NTS

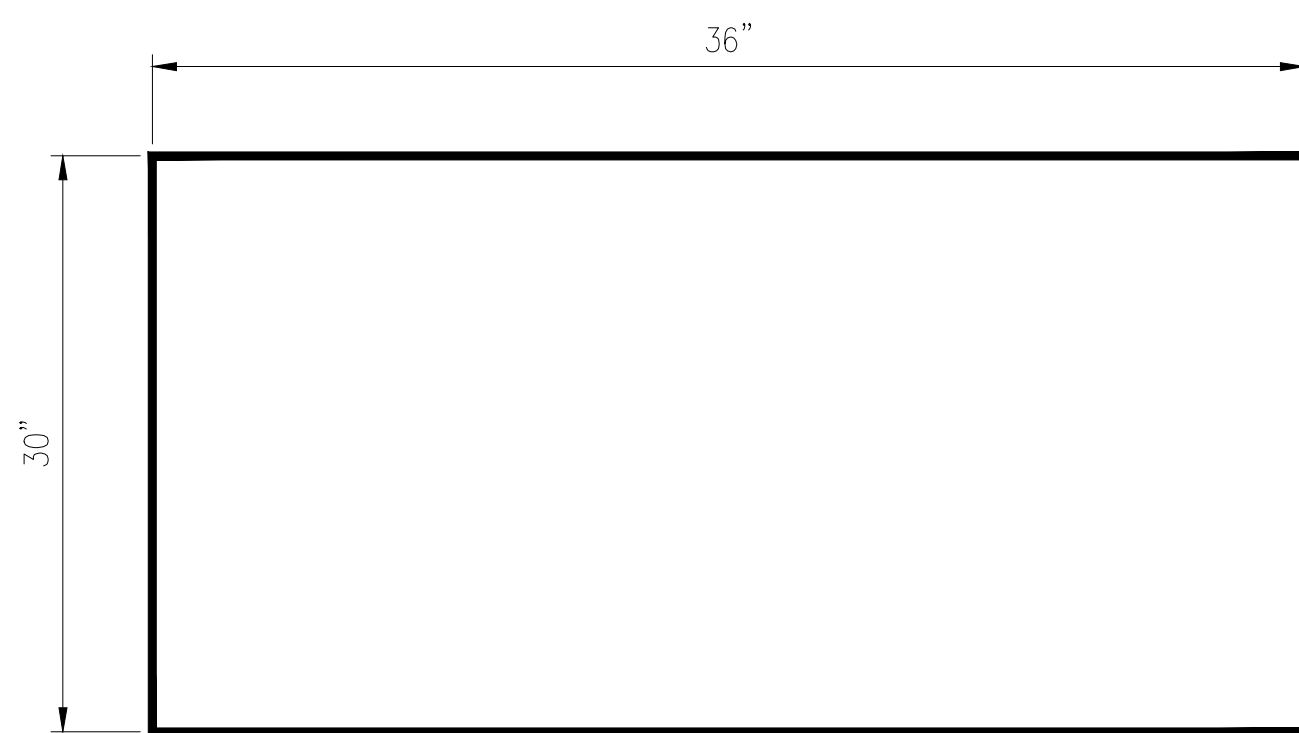


1
18" X 18"
LEGEND, BORDER, & SYMBOL-
WHITE (RETROREFLECTIVE)
BACKGROUND-RUSSET
(RETROREFLECTIVE)



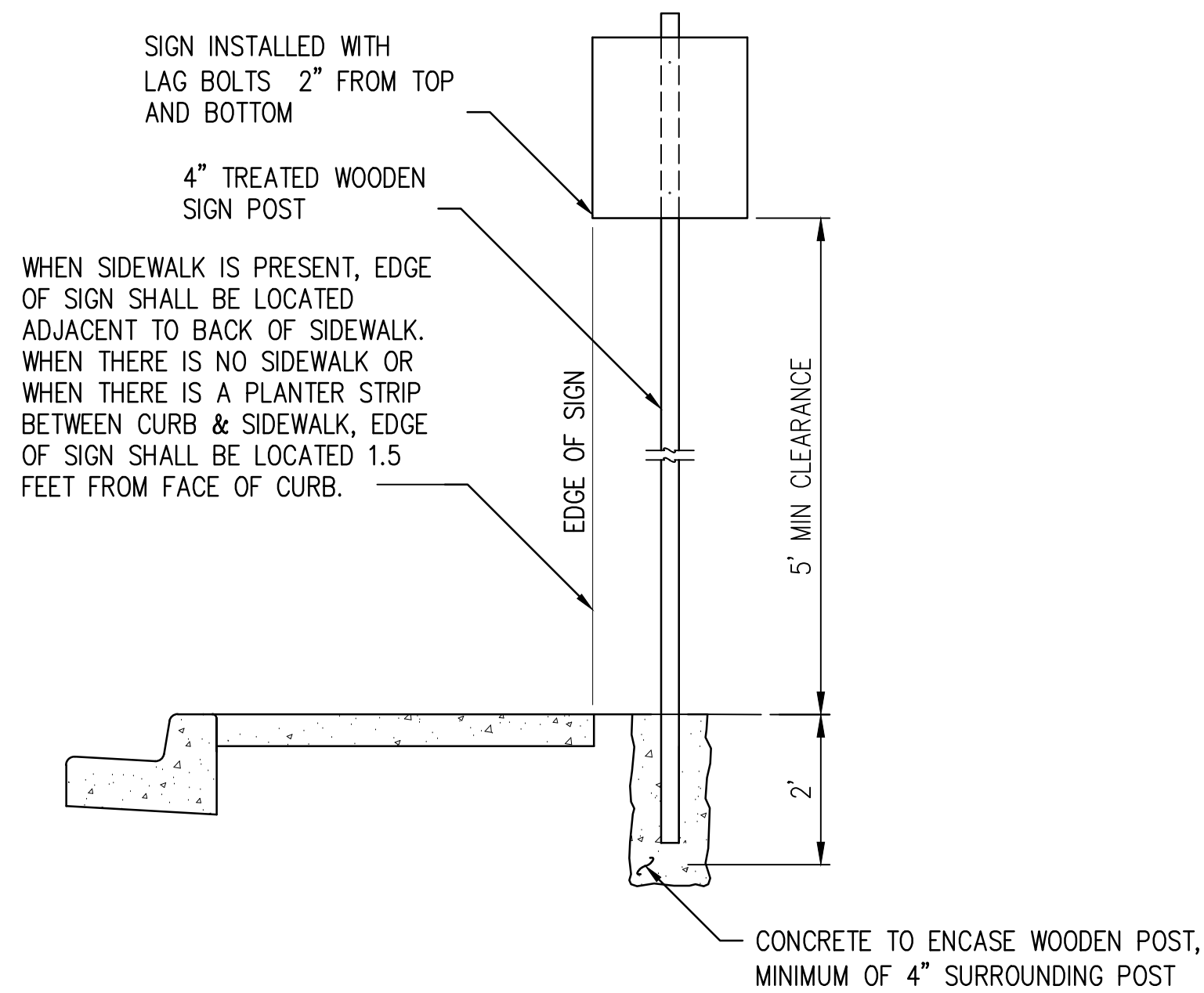
2
R7-8A
12" X 6"
LEGEND-WHITE (RETROREFLECTIVE)
BACKGROUND-RUSSET
(RETROREFLECTIVE)

HANDICAP PARKING SIGN DETAIL 11
NTS

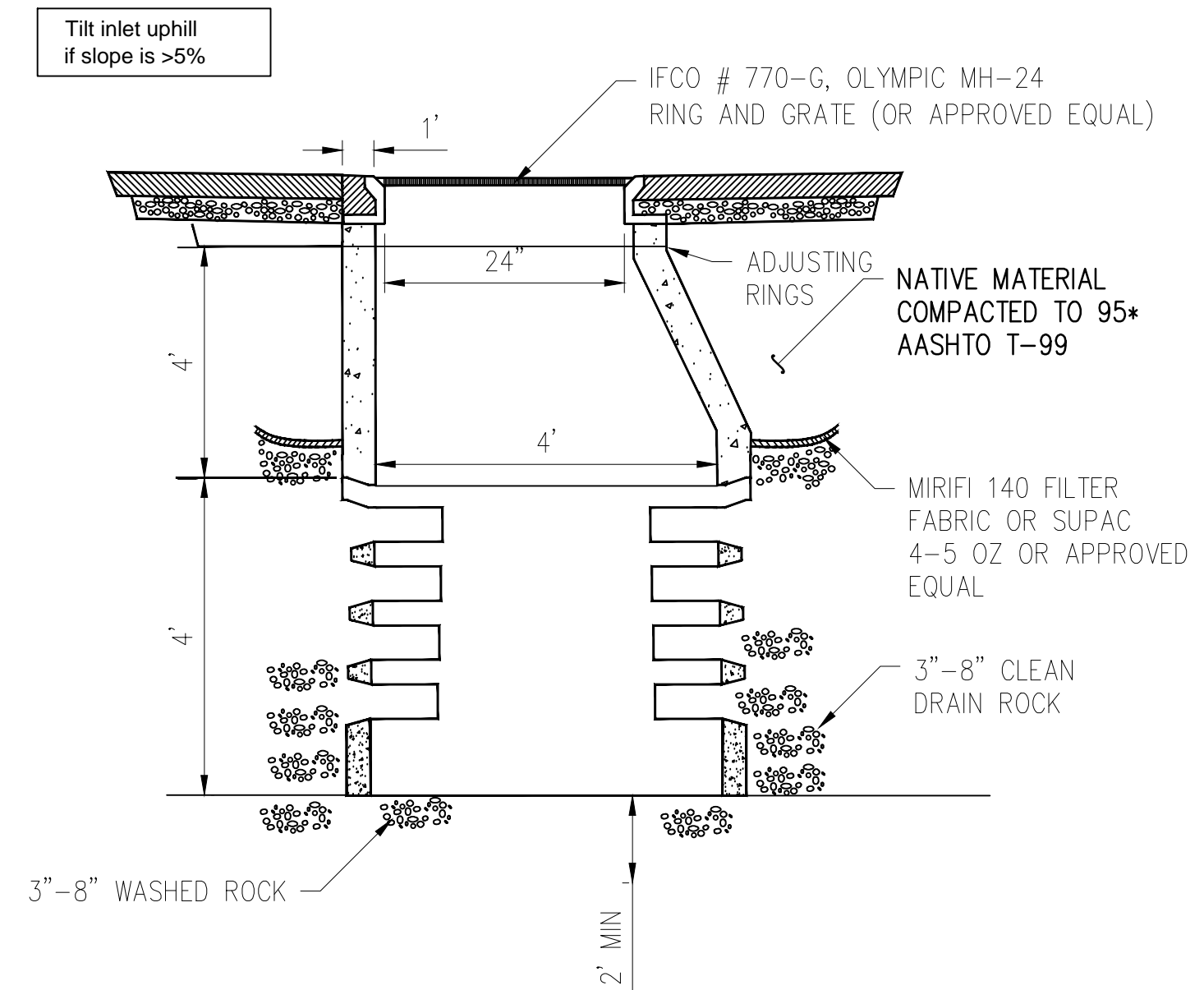


36"X30" GUIDE SIGN
SIGN TO BE DESIGNED AND SOLD TO
CONTRACTOR BY OWNER

GUIDE SIGN 1 DETAIL 11
NTS



SIGN CONNECTION DETAIL 12
NTS



DRAINAGE SUMP DETAIL 13
NTS

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APPROVED BY: DATE: _____

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APPROVED BY: DATE: _____

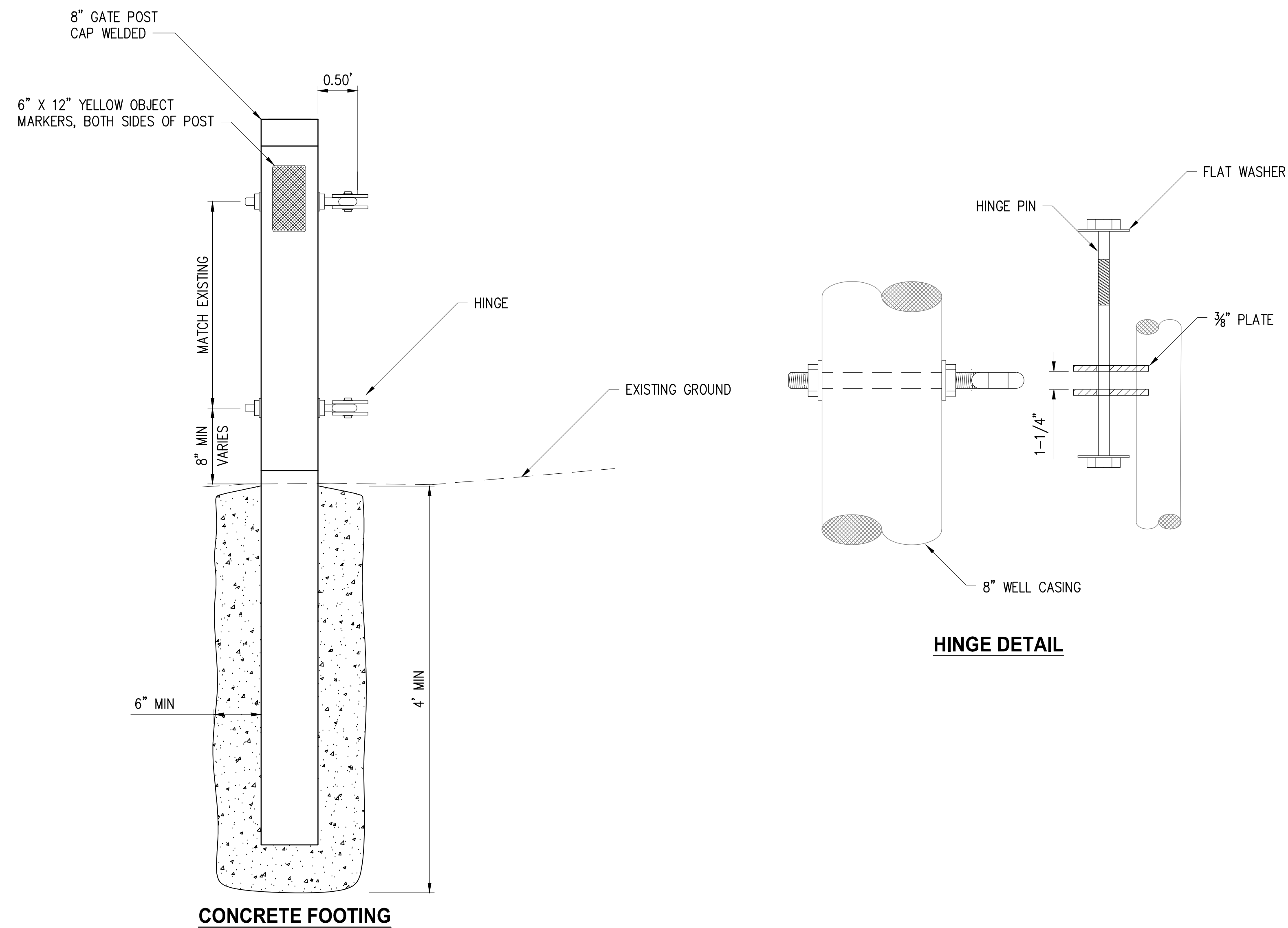


Montana Fish & Wildlife

TYPICAL DETAILS

TRAVELER'S REST PARKING IMPROVEMENTS

SHEET: 9 of 11



GATE POST DETAIL 18
NTS

ACL 3/2014
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APPROVED BY: DATE:

APPROVED BY: DATE:
APPROVED BY: DATE:



**Montana Fish,
Wildlife & Parks**

TYPICAL DETAILS

TRAVELER'S REST PARKING IMPROVEMENTS

SHEET: 11
of
11

GENERAL PROJECT NOTES

A. COORDINATE THE INSTALLATION OF ELECTRICAL MATERIAL ITEMS WITH THE PROJECT ENGINEER.

B. FIELD VERIFY DIMENSIONS AND INSTALLED INFRASTRUCTURE USING THE CIVIL ENGINEERING DRAWINGS.

C. SCHEDULE 80 PVC SLEEVES SHALL BE USED TO PROTECT THE UNDERGROUND BRANCH CIRCUITS WHEN PASSING UNDER PAVEMENT AND NON-PAVED TRAILS AND ROADWAYS.

SCHEDULE 80 PVC SLEEVES SHALL ALSO BE USED TO PROTECT UNDERGROUND BRANCH CIRCUITS WHEN THEY ARE INSTALLED ABOVE BURIAL DEPTH AS IN SUPPLIES TO POLE MOUNTED LIGHT FIXTURES. SLEEVES SHALL BE TERMINATED WITH A SWEEP ELBOW AT BURIAL DEPTH.

D. THE WORD ‘CONTRACTOR’ ON THESE ELECTRICAL DRAWINGS MEANS THE ENTIRE CONTRACTOR TEAM.

E. THE WORD ‘COORDINATE’ MEANS WORK WITH THE ENTITY TO PROVIDE THOSE CONTRACTOR SERVICES THAT MAY BE REQUIRED TO ACCOMPLISH THE WORK. THIS INCLUDES DETERMINING THE ELECTRICAL REQUIREMENTS FROM A SPECIFIC ENTITY SUCH AS A UTILITY OR OTHER AGENCY INVOLVED WITH THE PROJECT AND INCLUDING SUCH REQUIREMENTS AS PART OF BASIC SERVICES.

F. COMPLY WITH PROVISIONS OF APPLICABLE CODES AND REQUIREMENTS FROM LOCAL AUTHORITIES HAVING JURISDICTION. IN THE EVENT OF CONFLICTING GUIDELINES BETWEEN MULTIPLE DIRECTIVES, THE MOST RESTRICTIVE WILL PREVAIL.

G. CONTRACTOR IS RESPONSIBLE FOR COORDINATION OF PROJECT REQUIREMENTS AND PROVISION OF ADEQUATE AND TIMELY INFORMATION TO ALL TRADES CONCERNED FOR MATTERS INVOLVING MULTIPLE TRADES.

H. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL UTILITY LOCATES.

I. CATALOG SHEETS ARE INCLUDED WITH THE DRAWING SET FOR CONTRACTOR UNDERSTANDING. THE CONTRACTOR SHALL OBTAIN A COMPLETE DRAWING PACKAGE FOR BOTH BIDDING AND CONSTRUCTION. ANYTHING LESS WILL PROVIDE INSUFFICIENT INFORMATION FOR THE CONTRACTOR TO PROPERLY BID AND CONSTRUCT THIS PROJECT.

J. SPECIFICATIONS ARE INCLUDED IN THIS DRAWING PACKAGE.

INDEX OF ELECTRICAL SHEETS

E0.0	ELECTRICAL PLAN INDEX
E1.0	ELECTRICAL SITE PLAN
E2.0	PHOTOS
E3.0	DETAILS
E3.1	DETAILS
E4.0	CATALOG SHEETS
E4.1	CATALOG SHEETS
E4.2	CATALOG SHEETS
E5.0	ELECTRICAL SPECIFICATIONS
E5.1	ELECTRICAL SPECIFICATIONS

PHOTOS OF THE GENERAL AREA OF WORK



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APPROVED BY:	DATE:

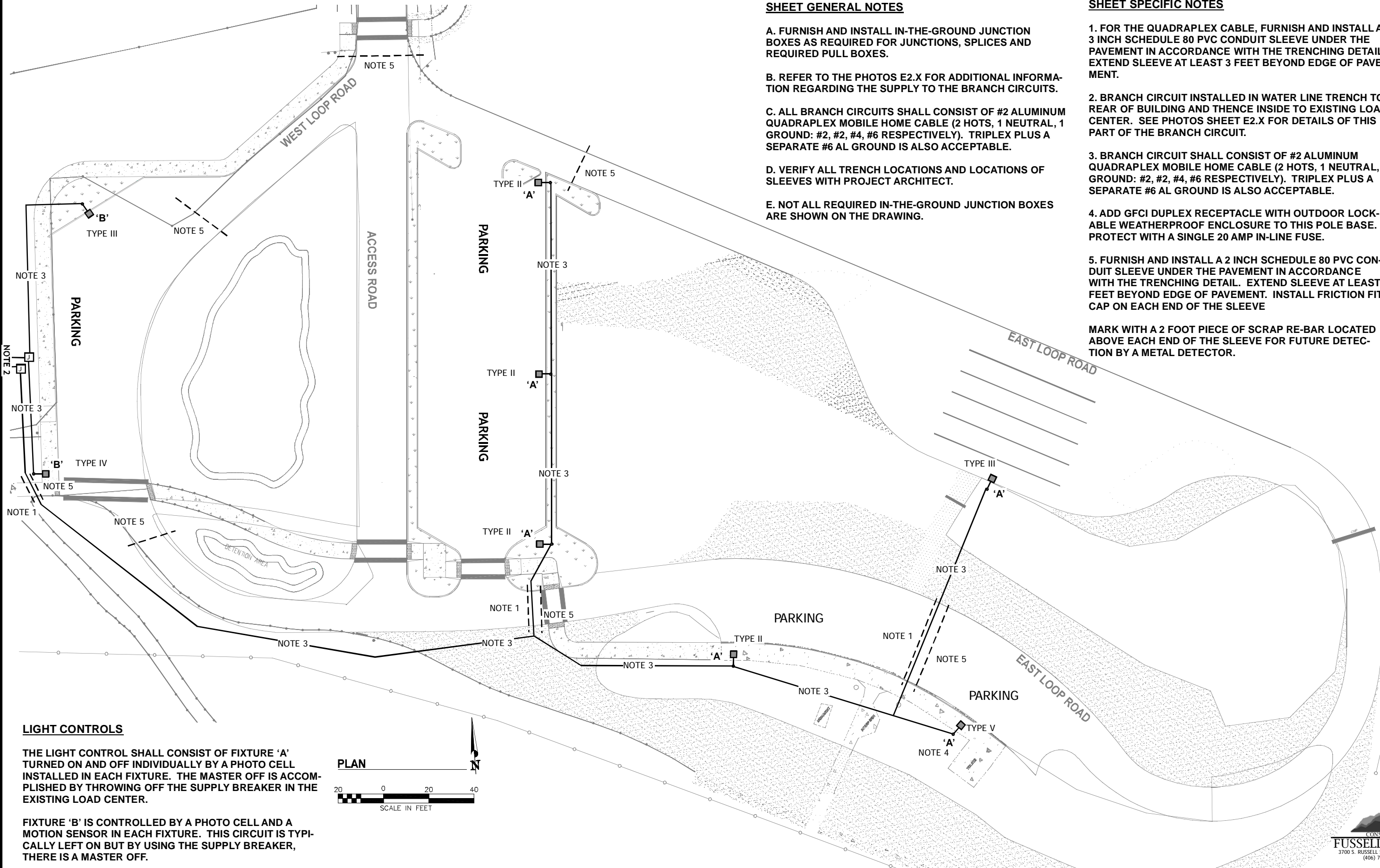
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Montana Fish,
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TRAVELER'S REST STATE PARK
PARKING IMPROVEMENTS

SHEET: E0.0
of
10



SHEET GENERAL NOTES

- A. FURNISH AND INSTALL IN-THE-GROUND JUNCTION BOXES AS REQUIRED FOR JUNCTIONS, SPLICES AND REQUIRED PULL BOXES.
- B. REFER TO THE PHOTOS E2.X FOR ADDITIONAL INFORMATION REGARDING THE SUPPLY TO THE BRANCH CIRCUITS.
- C. ALL BRANCH CIRCUITS SHALL CONSIST OF #2 ALUMINUM QUADRAPLEX MOBILE HOME CABLE (2 HOTS, 1 NEUTRAL, 1 GROUND: #2, #2, #4, #6 RESPECTIVELY). TRIPLEX PLUS A SEPARATE #6 AL GROUND IS ALSO ACCEPTABLE.
- D. VERIFY ALL TRENCH LOCATIONS AND LOCATIONS OF SLEEVES WITH PROJECT ARCHITECT.
- E. NOT ALL REQUIRED IN-THE-GROUND JUNCTION BOXES ARE SHOWN ON THE DRAWING.

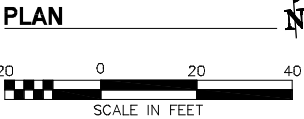
SHEET SPECIFIC NOTES

- 1. FOR THE QUADRAPLEX CABLE, FURNISH AND INSTALL A 3 INCH SCHEDULE 80 PVC CONDUIT SLEEVE UNDER THE PAVEMENT IN ACCORDANCE WITH THE TRENCHING DETAIL. EXTEND SLEEVE AT LEAST 3 FEET BEYOND EDGE OF PAVEMENT.
 - 2. BRANCH CIRCUIT INSTALLED IN WATER LINE TRENCH TO REAR OF BUILDING AND THENCE INSIDE TO EXISTING LOAD CENTER. SEE PHOTOS SHEET E2.X FOR DETAILS OF THIS PART OF THE BRANCH CIRCUIT.
 - 3. BRANCH CIRCUIT SHALL CONSIST OF #2 ALUMINUM QUADRAPLEX MOBILE HOME CABLE (2 HOTS, 1 NEUTRAL, 1 GROUND: #2, #2, #4, #6 RESPECTIVELY). TRIPLEX PLUS A SEPARATE #6 AL GROUND IS ALSO ACCEPTABLE.
 - 4. ADD GFCI DUPLEX RECEPTACLE WITH OUTDOOR LOCK-ABLE WEATHERPROOF ENCLOSURE TO THIS POLE BASE. PROTECT WITH A SINGLE 20 AMP IN-LINE FUSE.
 - 5. FURNISH AND INSTALL A 2 INCH SCHEDULE 80 PVC CONDUIT SLEEVE UNDER THE PAVEMENT IN ACCORDANCE WITH THE TRENCHING DETAIL. EXTEND SLEEVE AT LEAST 3 FEET BEYOND EDGE OF PAVEMENT. INSTALL FRICTION FIT CAP ON EACH END OF THE SLEEVE
- MARK WITH A 2 FOOT PIECE OF SCRAP RE-BAR LOCATED ABOVE EACH END OF THE SLEEVE FOR FUTURE DETECTION BY A METAL DETECTOR.

LIGHT CONTROLS

THE LIGHT CONTROL SHALL CONSIST OF FIXTURE 'A' TURNED ON AND OFF INDIVIDUALLY BY A PHOTO CELL INSTALLED IN EACH FIXTURE. THE MASTER OFF IS ACCOMPLISHED BY THROWING OFF THE SUPPLY BREAKER IN THE EXISTING LOAD CENTER.

FIXTURE 'B' IS CONTROLLED BY A PHOTO CELL AND A MOTION SENSOR IN EACH FIXTURE. THIS CIRCUIT IS TYPICALLY LEFT ON BUT BY USING THE SUPPLY BREAKER, THERE IS A MASTER OFF.



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TRAVELER'S REST STATE PARK PARKING IMPROVEMENTS

NOTE THAT THE EXISTING LOAD CENTER IS LOCATED ON THE REAR WALL OF THE BUILDING, PROBABLY OPPOSITE OF THE METER/MAIN.

FURNISH AND INSTALL TWO 2 POLE BREAKERS IN THESE 4 AVAILABLE SLOTS.



PHOTO E2.0-1 EXISTING GE LOAD CENTER

BRANCH CIRCUIT INSTALLATION

FOR EACH BRANCH CIRCUIT:

1. FURNISH AND INSTALL #10 COPPER THWN CONDUCTORS IN EMT CONDUIT FROM THE EXISTING LOAD CENTER, SURFACE MOUNTED ON THE INSIDE WALL, THROUGH THE REAR WALL OF THE BUILDING, SURFACE MOUNTED ON THE OUTSIDE WALL DOWN TO GRADE LEVEL AND THENCE TRANSITION TO SCHEDULE 80 PVC CONDUIT.
2. FROM GRADE LEVEL CONTINUE THE #10 COPPER THWN CONDUCTORS IN SCHEDULE 80 PVC CONDUIT WITH SWEEP ELBOWS UNDERGROUND, USING THE TRENCH DETAIL, OVER TO THE CORNER OF THE BUILDING.
3. AT THE CORNER OF THE BUILDING, TRANSITION USING AN IN-THE-GROUND JUNCTION BOX TO DIRECT BURY QUADRAPLEX CABLE. IT IS EXPECTED THAT THE CONTRACTOR WILL JOINTLY USE THE TRENCH BEING DUG FOR A NEW WATER LINE. THE CONTRACTOR SHALL COORDINATE WITH THE WATER LINE TRENCHING CONTRACTOR TO CREATE THE SIDE SHELF FOR THE ELECTRICAL CABLING IN ACCORDANCE WITH THE JOINT USE TRENCHING DETAIL.
4. CONTINUE THE QUADRAPLEX CABLE IN THE JOINT USE WATER LINE TRENCH AS FAR AS POSSIBLE AND THENCE CONTINUE ON TO THE IN-THE-GROUND JUNCTION BOXES INDICATED ON SHEET E1.0 USING THE TRENCH-ING DETAIL.
5. SEE SHEET E1.0 FOR THE REMAINDER OF THE BRANCH CIRCUIT ROUTING.

SURFACE MOUNT THE TWO BRANCH CIRCUITS, EACH IN A SEPARATE CONDUIT, ON THE REAR OF THE BUILDING. ADJUST THE PENETRATION FROM INSIDE TO OUTSIDE TO AVOID EXISTING SURFACE MOUNTED EQUIPMENT.



PHOTO E2.0-2 REAR OF EXISTING BUILDING

AT THE REAR CORNER TRANSITION TO DIRECT BURY QUADRAPLEX JOINTLY USING THE TRENCH WITH A NEW WATER LINE INSTALLATION.

THE WATER LINE TRENCH SHOWN IS ONLY APPROXIMATE.



PHOTO E2.0-3 SIDE OF EXISTING BUILDING

SAME GATE

FRONT OF BUILDING

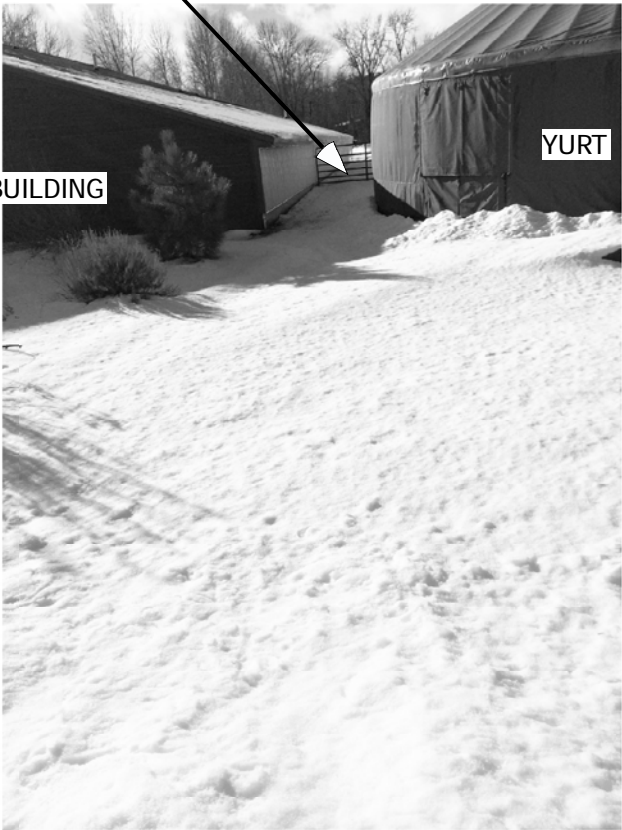


PHOTO E2.0-4 SIDE OF EXISTING BUILDING LOOKING FROM FRONT

YURT

FOREGROUND OF THIS PICTURE IS WHERE THE IN-THE-GROUND JUNCTION BOXES ARE TO BE INSTALLED AS INDICATED ON SHEET E1.0.

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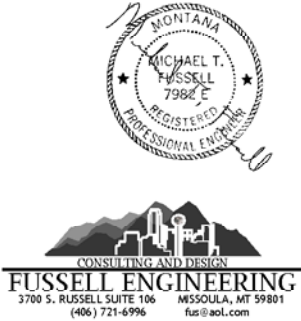
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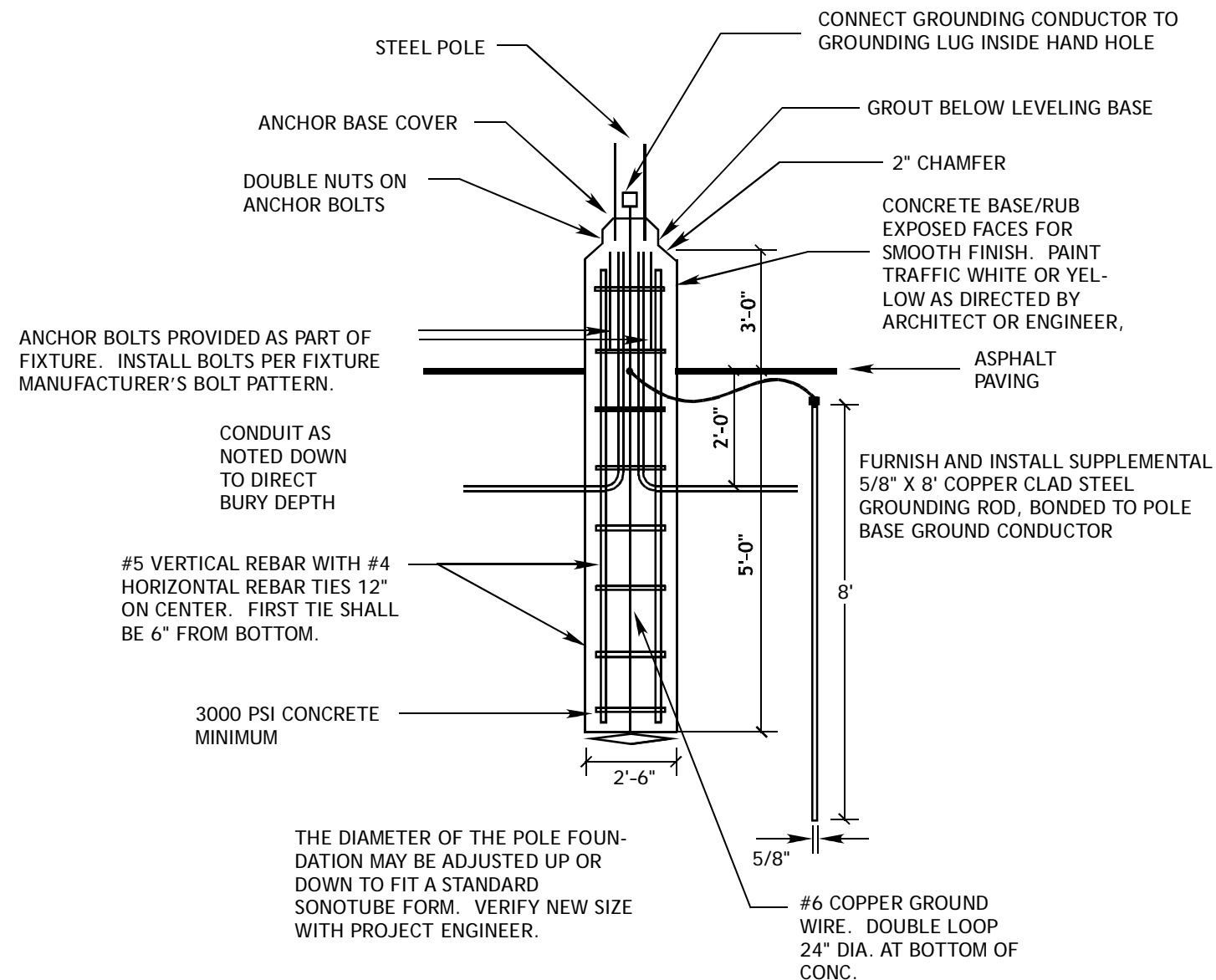


**Montana Fish,
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TRAVELER'S REST STATE PARK
PARKING IMPROVEMENTS

SHEET: E2.0
of
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POLE BASE DETAIL
NOT TO SCALE

FIXTURES 'A' AND 'B'
ROAD LIGHTS
GENERAL

The contractor furnishes and installs Parking Lot Lighting Fixture 'A' and 'B' mounted on steel poles as indicated on this sheet and in the catalog sheets.

FIXTURE PACKAGE

The contractor shall furnish and install the complete light fixture package including base, base concrete, anchor, pole, pole mounts, and the light fixture.

FOUNDATION

GENERAL

The contractor shall furnish and install concrete foundations for each of the trail light and parking lot light fixture poles in accordance with these specifications and the manufacturer's recommendation. The manufacturer of the pole base should have a bolt pattern for the correct installation of the anchor bolts.

Note: Coordination with the general contractor with regards to concrete will be required to reduce costs. The electrical contractor will be responsible for seeing that the concrete foundations for lighting fixtures are installed in accordance with the manufacturer's specifications and that anchor bolts as needed are installed in accordance with the manufacturer's template.

CONCRETE SPECIFICATION

If the concrete specification for the civil engineering portion of the project does not apply to the light fixture foundation, the following specification shall govern.

Each concrete foundation shall be accordance with the detail located below. The length and width dimensions shall be governed by the manufacturer's recommendation. The manufacturer's template shall be used to position the mounting bolts. The concrete shall be 3000 PSI. The reinforcing rods shall be such that no point of the reinforcing rod is within 6 inches of the concrete surface. The reinforcing rods shall be tacked or wired together.

GROUNDING

Bond the ground conductor in the parking lot light supply branch circuit to the pole base ground lug.

FUSING

Each parking lot light shall be equipped with individual fusing, one for each hot conductor.



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TRAVELER'S REST STATE PARK
PARKING IMPROVEMENTS

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Ecolume and Decolume are rectilinear arm-mounted area luminaires, also suitable for wall mounting. The precision segmented optical systems provide required light levels, even illumination, wide pole spacings and glare control. The housing is dieformed and the door frame is extruded aluminum. The luminaire is completely sealed and gasketed, preventing intrusion from moisture, insects and contaminants. Decolume luminaires feature three (3) decorative ribs along the lower portion of the housing. The ribs are permanent design elements, an integral part of the dieformed housing. Decolume luminaires may be specified with factory applied color accents which nest in the twin reveals at the lower end of the housing.

Flat glass lens luminaires provide full cutoff performance. Sag lens Luminaires using 3V/QV optics set to lower socket position or Mallmaster optics provide semi-cutoff performance. Other sag lens luminaires provide cutoff performance.

PREFIX	MOUNTING	DISTRIBUTION	WATTAGE	VOLTAGE	FINISH	OPTIONS
ECA18	1		175MH			

Enter the order code into the appropriate box above. Note: Gardco reserves the right to refuse a configuration. Not all combinations and configurations are valid. Refer to notes below for exclusions and limitations. For questions or concerns, please consult the factory.

PREFIX

	Ecolume	Decolume
Arm Mount to Pole*	ECA14	DECA14
	ECA18	DECA18
	ECA23	DECA23
Direct Wall Mount	ECW14	DECW14
	ECW18	DECW18
	ECW23	DECW23
Wall Mount with Arm	ECWA14	DECWA14
	ECWA18	DECWA18
	ECWA23	DECWA23

*Arm mounting on round poles is designed to mount to poles measuring 3.5" OD or larger only.

DISTRIBUTION

Horizontal Lamp SEE SHEET E1.0 FOR LIGHT DISTRIBUTION

2H	Type II
3H	Type III
FH	Type IV Forward Throw
BLC	Backlight Control (18" only; 400MHPSMH requires BT28/E28 lamp.)
QH	Type V

Vertical Lamp

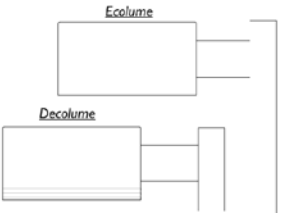
3V ^{1,2,3}	Type III Vertical Lamp
FV ^{1,2}	Type IV Forward Throw Vertical Lamp
QV ^{1,2,3}	Type V Vertical Lamp

3V-RNC^{1,2} Type III Vertical Lamp, Reduced Nadir Candlepower (23" only)
QV-RNC^{1,2} Type V Vertical Lamp, Reduced Nadir Candlepower (23" only)

RNC (Reduced Nadir Candlepower) optics should be specified only in applications requiring extreme maximum to minimum uniformity ratios (5 to 1 or lower). Reduced luminaire efficiency with RNC optics will result in lower average footcandle levels.

3SV ¹	Type III Vertical Lamp Mallmaster Semi-cutoff (23" only)
QSV ¹	Type V Vertical Lamp Mallmaster Semi-cutoff (23" only)

1611 Clovis Barker Road, San Marcos, TX 78666
(800) 227-0758 (512) 753-1000 FAX: (512) 753-7855 sitelighting.com
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Philips Gardco reserves the right to change materials or modify the design of its product without notification as part of the company's continuing product improvement program.
79215-50/0811



MOUNTING

- 1** Single Pole Mount
- 2** Twin Pole Mount at 180°
- 2@90°** Twin Pole Mount at 90°
- 3** 3-way Pole Mount at 90°
- 3@120°** 3-way Pole Mount at 120°
- 4** 4-way Pole Mount

Use "1" for wall mounted units.

1. 14" and 18" luminaires with vertical lamp optics are supplied standard with high temperature resistant thermoplastic sag lens. 23" luminaires with vertical lamp optics are supplied standard with a sag glass lens.

2. 18" and 23" 3V/QV optical systems feature an upper (factory set) cutoff socket position. For wider spacings, a lower (field adjustable) semi-cutoff socket position may be set.

3. 14" vertical lamp optics require a medium base lamp. Not Available with 480V.

PHILIPS



MOUNT FIXTURE AT 20 FEET (FROM TOP OF POLE BASE) ON A SINGLE STEEL POLE IN ACCORDANCE WITH POLE BASE DETAIL. THE LIGHT FIXTURE WILL BE ABOUT 23 FEET ABOVE GRADE.

FIXTURE 'A'

WATTAGE

Wattages marked with circle "E" meet federal energy efficiency standards applicable to 150 watt through 500 watt metal halide luminaires only.

	14"	18"	23"
Pulse Start MH Magnetic Ballast	100MH ^{1,2} 150MH ^{1,2} 175PSMH^{1,2} 200MH ^{1,2}	250PSMH ^{1,2} 250PS90 ^{1,2} 320PSMH ^{1,2} 350PSMH ^{1,2} 400PSMH ^{1,2}	450PSMH ^{1,2} 750PSMH ^{1,2} 775PSMH ^{1,2} 875PSMH ^{1,2} 1000PSMH ^{1,2}
	60CMPE ^{1,1} 90CMPE ^{1,1} 140CMPE ^{1,1}	60CMPE ^{1,1} 90CMPE ^{1,1} 140CMPE ^{1,1}	
CosmoPolis Electronic System			
MasterColor Elite Electronic System			
Pulse Start MH Electronic Ballast		250PSE ^{1,1} 320PSE ^{1,1}	
Standard MH Magnetic Ballast ^{1,2}	175MH ^{1,2}	250MH ^{1,2} 400MH ^{1,2}	400MH ^{1,2} 1000MH ^{1,2}
High Pressure Sodium Magnetic Ballast	70HPS ^{1,1} 100HPS ^{1,1} 150HPS ^{1,1}	250HPS 400HPS	400HPS 750HPS 1000HPS

^{1,2} 175MH, 250MH and 400MH not available for sale in the United States.

^{1,2,3} 250PS90 includes a 90% efficient magnetic PSMH ballast, meeting the requirements of California Title 20, effective 1/1/2010.

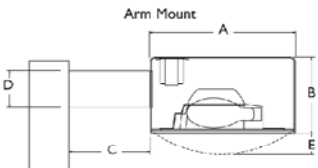
OPTIONS

HS ^{1,2}	Internal House Side Shield	ACR ^{1,2}	Acrylic Sag Lens
F	Fusing	POLY ^{1,2}	Polycarbonate Sag Lens
LF ^{1,2}	In-Pole/In-Line Fusing	SG ^{1,2}	Sag Glass Lens
PCT ^{1,2}	Locking Type Photocontrol Receptacle with Photocontrol	QS ^{1,2}	Quartz Standby
PCR	Locking Type Photocontrol Receptacle	QST ^{1,2}	Quartz Standby - Timed Delay
PCB ^{1,2}	Button Photocontrol	Q924 ^{1,2}	Quartz Emergency
MF ^{1,2}	Mast Arm Fitter	QT924 ^{1,2}	Quartz Emergency - Timed Delay
PTF2	Pole Top Fitter 2 3/8" X 4"	GMR ^{1,2}	Provision for Gardco Motion Response
PTF3	Pole Top Fitter 3 - 3 1/2" X 6"	L6 ^{1,2}	LumiStep Ballast 6 hour
PTF4	Pole Top Fitter 3 1/2 - 4" X 6"	L8 ^{1,2}	LumiStep Ballast 8 hour
AP ^{1,2,3}	Adjustable Knuckle - Square Pole Mount	L10 ^{1,2}	LumiStep Ballast 10 hour
AT ^{1,2}	Adjustable Knuckle - Tenon Mount		
CR ^{1,2}	Colored Reveals		

FURNISH ARM ACCESSORIES AS REQUIRED

DIMENSIONS AND EPA (CONTINUED ON PAGE 3)

ARM MOUNT	14"	18"	23"
A	14" sq 35.56cm	18" sq 45.72cm	23" sq 58.42cm
B	7" 17.78cm	10" 25.40cm	14.5" 36.83cm
C Arm Length	6" 15.24cm	9" 22.86cm	12" 30.48cm
D Arm Height	5" 12.70cm	5" 12.70cm	8" 20.32cm
E Drop Lens	2" 5.08cm	4" 10.16cm	6.5" 16.51cm



ECOLUME and DECOLUME	EPA (Effective Projected Area) ft² / m²		
	Single	Twin 180°	Quad
14" units	1.1 / .103	2.2 / .205	2.7 / .251
18" units	1.9 / .177	3.8 / .354	4.8 / .446
23" units	3.6 / .335	7.3 / .679	8.8 / .818

ECOLUME and DECOLUME	Single Luminaire Weight (lbs / kg)
14" units	30 / 13.61
18" units	50 / 22.68
23" units	90 / 40.83

VOLTAGE

- 120
- 208
- 240
- 277
- 347
- 480

QUAD
120/208/240/277
factory tied to 277V.

200-277
CMPE, MCE, and
PSE types only.

FINISH

- BRP** Bronze Paint
- BLP** Black Paint
- WP** White Paint
- NP** Natural Aluminum Paint
- OC** Optional Color Paint
Specify Optional Color or
RAL ex: OC-LGP or OC-RAL7024.
- SC** Special Paint
Specify. Must supply color chip.

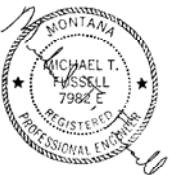
SET TO 240 VAC

- 4. Requires mogul base lamp in horizontal optics and medium base lamp in vertical optics.
- 5. Not Available in 480V.
- 6. Requires medium base lamp.
- 7. Requires mogul base lamp.
- 8. All 200MH and all MH 150W and below are pulse start by design.
- 9. Available with vertical lamp optics only.
- 10. Requires BT28 / E28 lamp.
- 11. CMPE and MCE types available in 120V, 200-277V, 347V, or 480V. 120V, 347V and 480V require and include an auxiliary transformer. For MCE types, "3K" indicates a 3,000°K lamp, "4K" indicates a 4,000°K lamp. PSE types available in 200 - 277V only.
- 12. Supplied standard for PHIV.
- 13. Kit includes In-Line Fuses.
- 14. Not Available with 480V.
- 15. Available for 18" or 23" units only. Requires 2 3/8" O.D. Mast Arm.
- 16. Only available with single and twin luminaires @ 180°. Mounts to square poles only.
- 17. Not available with 23" units.
- 18. In lieu of glass - Not available with 23" units.
- 19. See Q924 Table.
- 20. Available only with 14" 175PSMH or 150HPS and 18" 250PSMH through 400PSMH or 250HPS through 400HPS wattages. Includes dual-level capacitor and wiring to connect to Gardco Motion Response System.
- 21. 18" or 23" only. Supplied standard with 23" luminaires with vertical optics.
- 22. Available with CosmoPolis system only. See submittal sheet GE200-005 for complete information on LumiStep ballasts.
- 23. Available with Decolume only. Specify color. Contact factory for availability.

(Note 19) QS / Q924 Table	
HID Lamp Watts	Maximum Quartz Lamp Watts
175 watts or less	100 Watts
Above 175 watts up to 400 watts	150 Watts

14" luminaires limited to 100 watt quartz lamp maximum regardless of HID wattage. QS, QST, Q924 and QT924 options are not available in luminaires above 400 watt HID.

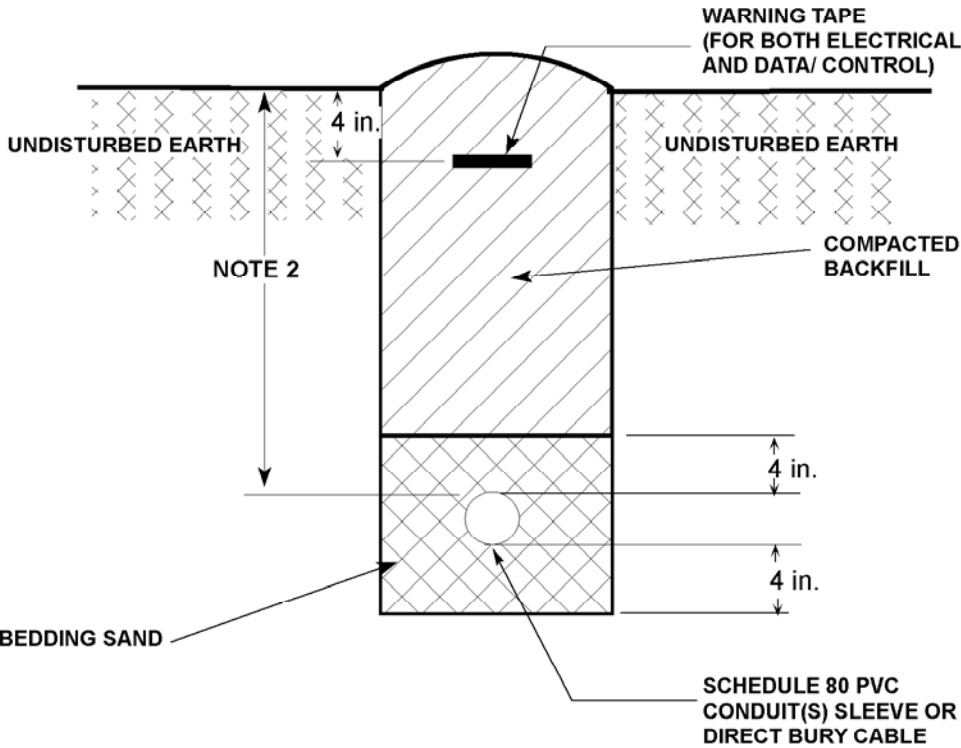
PHILIPS



Montana Fish & Wildlife

TRAVELER'S REST STATE PARK
PARKING IMPROVEMENTS

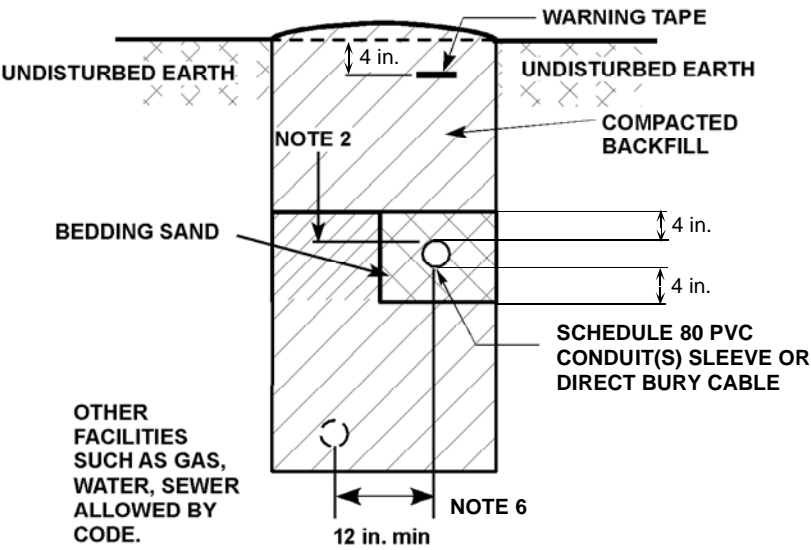
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TRENCHING DETAIL NOTES:

1. SINGLE CONDUIT OR CABLE ASSEMBLY SHOWN. MULTIPLE CONDUITS OR CABLE ASSEMBLIES MAY BE USED.
2. BURIAL DEPTH:
24 INCHES MINIMUM FOR ELECTRICAL BRANCH CIRCUIT CONDUCTOR CONDUITS OR CABLE ASSEMBLIES.
3. IF MORE THAN ONE CONDUIT OR CABLE ASSEMBLY OF THE SAME FACILITY IS INSTALLED IN A TRENCH, THE CONDUITS OR CABLE ASSEMBLY SHALL BE SEPARATED BY 2 INCHES MINIMUM.
4. CONDUIT OR CABLE ASSEMBLY SHALL NOT BE LOCATED ANY CLOSER THAN 3 INCHES FROM TRENCH SIDE WALL.

TRENCHING AND BEDDING DETAIL
NOT TO SCALE



TRENCHING DETAIL NOTES:

1. SINGLE CONDUIT OR CABLE ASSEMBLY SHOWN. MULTIPLE CONDUITS OR CABLE ASSEMBLIES CAN BE USED.
2. BURIAL DEPTH 24 INCHES MINIMUM.
3. IF MORE THAN ONE CONDUIT OR CABLE ASSEMBLY OF THE SAME FACILITY IS INSTALLED IN A TRENCH, THE CONDUITS OR CABLE ASSEMBLY SHALL BE SEPARATED BY 9 INCHES MINIMUM.
4. INSTALL CONDUITS OR CABLE ASSEMBLIES 24 INCHES (UNLESS OTHERWISE NOTED) BELOW FOOTING FOUNDATION OR PAVEMENT BASE FILL.
5. CONDUIT OR CABLE ASSEMBLY SHALL NOT BE LOCATED ANY CLOSER THAN 3 INCHES FROM TRENCH SIDE WALL.
6. TO REDUCE TRENCHING COSTS AND IF THE 12 INCH HORIZONTAL CLEARANCE AND SIDE WALL CLEARANCES CAN BE MAINTAINED, THE CONTRACTOR MAY INSTALL THE ELECTRICAL CONDUIT OR CABLE ASSEMBLY AT THE SAME DEPTH AS THE WATER LINE.

TRENCHING AND BEDDING DETAIL (JOINT USE)
NOT TO SCALE



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Montana Fish & Wildlife
PARKS

TRAVELER'S REST STATE PARK
PARKING IMPROVEMENTS

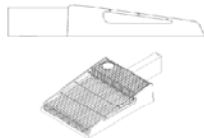


Emco LED Area Luminaire - Generation 2

Page 1 of 4

Featuring Automatic Profile Dimming and Motion Response

Philips Gardco's Emco product family features the LED Area luminaire. These luminaires combine low profile style, advanced LED performance and advanced thermal management technology to deliver outdoor area lighting that is as energy efficient and aesthetically pleasing as it is remarkably economical. Versions are available with automatic profile dimming and motion response capability as well. The housing is one-piece, die cast aluminum and mounts to a pole, utilizing an extruded arm, and mounts easily to a wall or to a mast arm while providing smooth visual transitions. LED Area optical systems provide IES Types II, III, IV, and V distributions. The luminaires feature state of the art integral thermal control to maximize LED system performance and life. The door frame is single piece die cast aluminum. LED Area luminaires are finished with a fade and abrasion resistant TGIC powdercoat. LED Area luminaires provide full cutoff performance.



PREFIX	MOUNTING	OPTICAL SYSTEM	LED WATTAGE	LED SELECTION	VOLTAGE	FINISH	OPTIONS
ELA16-MRI	1		140LA				

Enter the order code into the appropriate box above. Note: Philips Gardco reserves the right to refuse a configuration. Not all combinations and configurations are valid. Refer to notes below for exclusions and limitations. For questions or concerns, please consult the factory.

PREFIX (See pages 3 and 4 for more details on luminaire configurations.)

Luminaire Description	Constant Wattage Full Light Output ¹	0-10V Dimming ² (For use with a 0-10V control system by others.)	Automatic Profile Dimming ³ (APD)	Motion Response		APD with Motion Response Override	
				Motion Sensor Location		Motion Sensor Location	
				Pole Mounted ²	Integral to Luminaire ³	Pole Mounted ²	Integral to Luminaire ³
16" LED Area Luminaire	ELA16	ELA16-DIM	ELA16-APD	ELA16-MR50	ELA16-MRI	ELA16-APD-MRO	ELA16-APD-MRI

1. 347V through 480V (HVU) input available in ELA16 and ELA16-DIM only. 347V through 480V (HVU) is NOT available in 90LA or 140LA LED Wattages.

2. Luminaires require one area motion sensor per pole (minimum) ordered separately. See Accessories on page 2. Available with 120V or 277V input only. 3. Available with 120V through 277V (UNIV) input only.

MOUNTING

- | | | | |
|--------|--------------------------|----|---|
| 1 | Single Pole Mount | W | Wall Mount, Recessed J-Box |
| 2 | Twin Pole Mount at 180° | WS | Wall Mount, Surface Conduit |
| 2@90 | Twin Pole Mount at 90° | MA | Mast Arm Mount (requires a 2 3/8" mast arm) |
| 3 | 3-way Pole Mount at 90° | | |
| 3@120° | 3-way Pole Mount at 120° | | |
| 4 | 4-way Pole Mount | | |

OPTICAL SYSTEM

- | | |
|---|----------|
| 2 | Type II |
| 3 | Type III |
| 4 | Type IV |
| 5 | Type V |

SEE SHEET E1.0 FOR LIGHT DISTRIBUTION

LED WATTAGE AND LUMEN VALUES

Ordering Code	LED Array Quantity	Total LEDs	LED Current (mA)	Average System Watts ⁴	LED Selection	Luminaire Initial Absolute Lumens ⁵			
						TYPE 2	TYPE 3	TYPE 4	TYPE 5
35LA	1	32	350	36.0	NW	3,190 (s)	3,407 (s)	3,223 (s)	3,182 (s)
55LA	1	48	350	54.0	NW	4,634 (s)	4,950 (s)	4,682 (s)	4,623 (s)
70LA	1	64	350	72.0	NW	6,019 (s)	6,429 (s)	6,081 (s)	6,004 (s)
90LA	1	80	350	88.3	NW	7,368 (s)	7,878 (s)	7,444 (s)	7,341 (s)
50LA	1	32	530	51.7	NW	4,400 (s)	4,715 (s)	4,445 (s)	4,386 (s)
80LA	1	48	530	77.6	NW	6,392 (s)	6,851 (s)	6,458 (s)	6,372 (s)
105LA-530	1	64	530	103.4	NW	8,302 (s)	8,897 (s)	8,387 (s)	8,275 (s)
140LA	1	80	580	142.4	NW	11,103 (s)	11,875 (s)	11,218 (s)	11,035 (s)
75LA	1	32	700	70.7	NW	5,500 (s)	5,879 (s)	5,557 (s)	5,432 (s)
105LA-700	1	48	700	103.7	NW	7,990 (s)	8,494 (s)	8,073 (s)	7,874 (s)
134LA	1	64	700	136.6	NW	10,377 (s)	11,061 (s)	10,484 (s)	10,294 (s)

4. Wattage may vary by +/- 8% due to LED manufacturer forward volt specification and ambient temperature. Wattage shown is average for 120V through 277V input. Actual wattage may vary by an additional +/- 10% due to actual input voltage. Actual test system wattage is shown in individual IES files on www.sitelighting.com.

5. Lumen values based on photometric tests performed in compliance with IESNA LM-79. Contact Gardco.Applications@philips.com if estimates for design purposes are needed for any values not shown. (s) indicates value is scaled based on tests of a similar, but not identical configurations.

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PHILIPS



MOUNT FIXTURE AT 20 FEET (FROM TOP OF POLE BASE) ON A SINGLE STEEL POLE IN ACCORDANCE WITH POLE BASE DETAIL. THE LIGHT FIXTURE WILL BE ABOUT 23 FEET ABOVE GRADE.

FIXTURE 'B'



Emco LED Area Luminaire - Generation 2

Page 2 of 4

Featuring Automatic Profile Dimming and Motion Response

LED SELECTION

- | | |
|----|---------------------------------|
| CW | Cool White - 5,700°K - 75 CRI |
| NW | Neutral White - 4000°K - 70 CRI |
| WW | Warm White - 3000°K - 80 CRI |

VOLTAGE

UNIV 120V through 277V, 50hz or 60hz SET TO 240 VAC

HVU¹ 347V through 480V, 50hz or 60hz

1. 347V through 480V (HVU) input available in ELA16 and ELA16-DIM only. 347V through 480V (HVU) is NOT available in 90LA or 140LA LED Wattages.

FINISH

- | | |
|-----|---|
| BRP | Bronze Paint |
| BLP | Black Paint |
| WP | White Paint |
| NP | Natural Aluminum Paint |
| OC | Optional Color Paint |
| | Specify Optional Color or RAL ex: OC-LGP or OC-RAL7024. |

OPTIONS

- | | |
|-----------------|------------------------------|
| F ⁶ | Fusing In Head |
| LF ⁷ | In-Line/In-Pole Fusing |
| PCR | Photocontrol and Receptacle |
| HS | Photocontrol Receptacle only |
| | External Houseside Shield |

- | | |
|------|--|
| PTF2 | Pole Top Fitter - 2 3/8" - 2 7/8" Dia. Tenon |
| PTF3 | Pole Top Fitter - 3" - 3 1/2" Dia. Tenon |
| PTF4 | Pole Top Fitter - 3 1/2" - 4" Dia. Tenon |
| DL | Diffusing Lens (reduces performance significantly) |

SPR⁷ Surge Protection for 120V through 277V Input meeting ANSI C62.41.2

SPRH⁷ Surge Protection for 347V through 480V Input meeting ANSI C62.41.2

SC

Special Paint
Specify. Must supply color chip.

6. Provide specific input voltage. PC option not available with 480V.
7. Not available with Fusing (F) option.

ACCESSORIES (Ordered separately)

MS-A-120V 120V Input - Area Motion Sensor for Pole Mounting with MR50 and APD-MRO luminaires

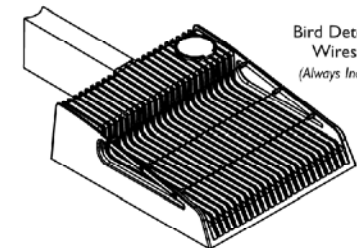
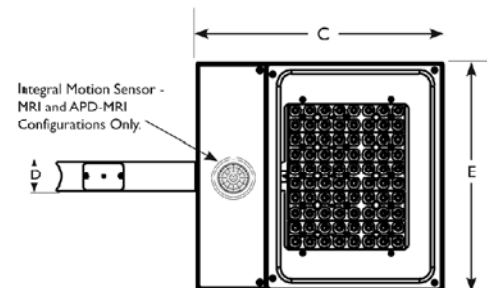
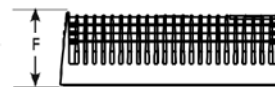
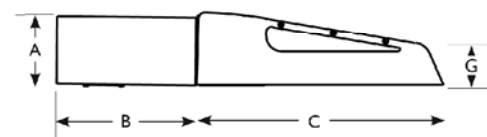
MS-A-277V 277V Input - Area Motion Sensor for Pole Mounting with MR50 and APD-MRO luminaires

Motion Sensors for pole mounting are ordered separately, with one (1) motion sensor required per pole location for MR50 and APD-MRO luminaires. See Luminaire Configuration Information on pages 3 and 4 for more details. Area motion sensor color is Arctic White only.

DIMENSIONS AND EPA (see also page 3)

FURNISH ARM ACCESSORIES AS REQUIRED

Arm Mount - Direct to Pole



Dimensions	ELA16"
A	4.5" / 11.43 cm
B	6.28" / 15.95 cm
C	16.53" / 41.99 cm
D	2" / 5.08 cm
E	15.2" / 38.61 cm
F	4.6" / 11.68 cm
G	1.53" / 3.89 cm

	Effective Projected Area (EPA)			Approximate Weight - Single Luminaire
	Single	Twin	3/4	
ELA16"	.87 ft ²	1.74 ft ²	2.49 ft ²	21 lbs 9.53 kg
	.081 m ²	.162 m ²	.232 m ²	

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Montana Fish & Wildlife

TRAVELER'S REST STATE PARK
PARKING IMPROVEMENTS

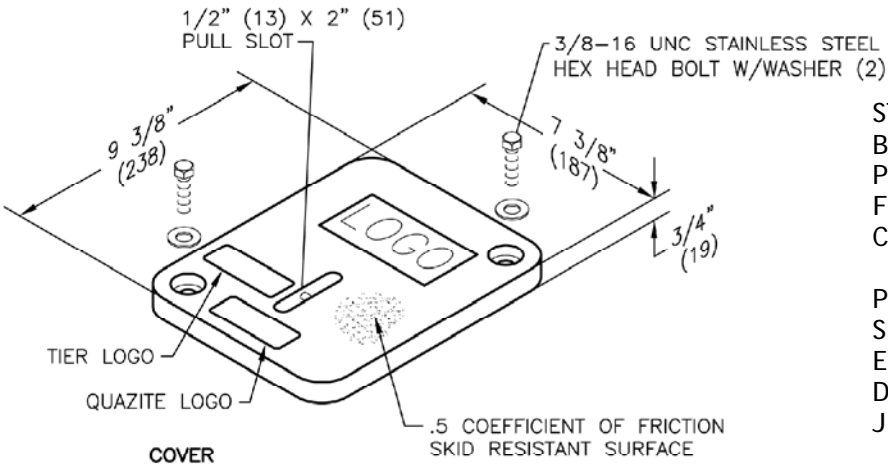
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6X8 SIZE SHOWN
ADJUST SIZE AS REQUIRED

SPECIFICATIONS/DATA

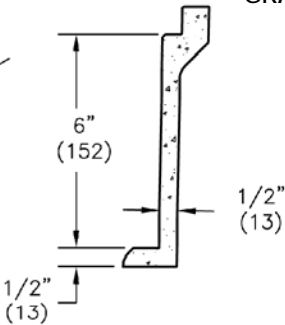
6" x 8" PC Style (Stackable) Assembly



STACK AND SIZE JUNCTION
BOXES AS REQUIRED TO
PROVIDE ADEQUATE SPACE
FOR BRANCH CIRCUIT URD
COIL OR SPLICES.

PROVIDE SCHEDULE 40
SLEEVES AND SWEEP
ELBOWS UP FROM BURIAL
DEPTH INTO BOTTOM OF
JUNCTION BOX.

THE JUNCTION BOX LID
SHALL BE FLUSH WITH
GRADE.



SELECT LID ID AS NECESSARY

09 Blank	26 High Voltage
10 C.A.T.V.	10 Irrigation
12 Communications	29 Lighting
14 Castable	32 Non-potable water
17 Electric	41 Street Lighting
21 Fiber Optics	43 Telephone
23 Gas	44 Traffic
24 Ground	46 Traffic Signal
	50 Water

Covers (Blank unless logo is specified)

DESCRIPTION	PART NO.	WEIGHT #	DESIGN/TEST LOAD #	ANSI TIER*
W/2 Bolts	PC0608HA00	4 (1.8 kg)	15,000 / 22,500	15
Gasketed w/4 Bolts	PC0608HC00	4 (1.8 kg)	15,000 / 22,500	15

* Gasketed covers and bolt grommets must be used with a gasketed box. Gaskets reduce the inflow of fluids but do not make the enclosure water tight.

Boxes (Stackable with self-aligning, replaceable EZ-Nut)

DESCRIPTION	PART NO.	WEIGHT #	DIMENSION A	DESIGN/TEST LOAD #	ANSI TIER*
Open Bottom	PC0608BA06	14 (6.4 kg)	6 3/4" (171 mm)	15,000 / 22,500	15
Open Bottom w/Gasket	PC0608BG06	14 (6.4 kg)	6 3/4" (171 mm)	15,000 / 22,500	15
Solid Bottom	PC0608DA06	15 (6.8 kg)	7 1/4" (184 mm)	15,000 / 22,500	15
Solid Bottom w/Gasket	PC0608DG06	15 (6.8 kg)	7 1/4" (184 mm)	15,000 / 22,500	15

Dimensions & weights in parentheses are metric equivalent.
* Loadings comply with ANSI/SCTE 77 (see page 9).

JANUARY 2011



IN-THE-GROUND JUNCTION BOX



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TRAVELER'S REST STATE PARK
PARKING IMPROVEMENTS

SHEET: E4.2
of
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BASIC ELECTRICAL REQUIREMENTS

1.1 GENERAL

A. The intent of the drawings is to indicate the general extent of work required for the project. The drawings for electrical work are diagrammatic, showing the location, type devices and equipment required. the drawings shall not be scaled for exact measurements. Provide all fixtures, lamps, devices, accessories, offsets and materials necessary to facilitate the system's functioning as indicated by the design and the equipment indicated.

1.2 ELECTRICAL INSTALLATIONS

A. Coordinate electrical equipment and materials installation with other building components.
B. Verify all dimensions by field measurements.
C. Where mounting heights are not detailed or dimensioned, install electrical services and overhead equipment to provide the maximum headroom possible.
D. Coordinate connection of electrical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide connection for each service.
E. All holes or passages through fire rated walls, fire stops, and other fire rated spaces resulting from electrical work must be sealed by the appropriate means to maintain the original fire rating of the wall, fire stop, or fire rated space.

1.3 NAMEPLATE DATA

A. Provide permanent operational data nameplate on each item of power operated equipment, indicating manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications; adequately packaged and protected to prevent damage during shipment, storage and handling.
B. Store equipment and materials at the site, Protect stored equipment and materials from damage.

1.5 ENVIRONMENTAL PROTECTION

A. The contractor shall not release any hazardous materials to the environment during the course of this work. If materials are encountered during demolition which are suspected to be hazardous, the contractor shall cease work and inform the Engineer for action by the Owner. If the contractor disturbs hazardous materials without consultation with the Engineer, abatement, mitigation, and restoration of the environment shall be the contractor's responsibility.
B. The contractor shall, in general, take all reasonable precautions and measures during the course of this work to protect and safeguard the natural and human environment. This shall be interpreted as a primary, rather than subordinate, requirement of the project.

1.6 CLEANING

A. Clean all light fixtures, lamps and lenses prior to final acceptance. Replace all inoperative lamps.
B. Clean up all waste or trash from the electrical work.

CODES AND STANDARDS

1.1 CODES AND STANDARDS

A. Comply with these specifications, project drawings, and all applicable local, State, and National laws, codes, standards, and regulations. In the event of differing requirements, the most stringent applies. Applicable portions of the following shall apply:
1. Building, other structures, and all facilities or systems with electrical installations within the scope of the National Electrical Code (NEC) published by the National Fire Protection Association (NFPA 70).
B. INSPECTIONS AND FEES
1. Inspection and approval by the State or local Electrical Inspector will be required prior to acceptance by the Owner.
2. The contractor is responsible for obtaining and paying for all necessary State or local permits and inspections.

1.2 SPECIAL REQUIREMENTS

The following are special requirements which may be more restrictive than the code:
1. Hot wires, neutral and ground wires are the same size unless otherwise indicated. Triplex cable assemblies may have reduced neutral and ground conductors.
2. A ground wire must be pulled in all raceways regardless of raceway construction. Raceways shall not be used as the only ground conductor.
3. All connections must be torqued to specifications using a torque wrench.
4. All neutral conductors must be insulated.
5. A ground wire must be installed for each circuit. A common ground wire for several circuits, even if located in the same conduit, is not allowed.
6. All connections to devices such as receptacles and switches shall be made using the device lug screw. Push-in connections shall not be used.

ELECTRICAL SYSTEM

1.1 QUALITY ASSURANCE

A. Installer's Qualifications: Firm with at least 3 years of successful installation experience on projects with electrical work similar to that required for this project.
B. UL Standards:
1. Comply with applicable requirements of U.L. safety standards pertaining to electrical systems. Provide electrical equipment, products, and components which have been UL-listed and labeled.
2. Comply with UL Standard 486A, "Wire Connectors and Soldering lugs for Use With Copper Conductors" including, but not limited to, tightening of electrical connectors to torque values indicated.
3. Comply with applicable requirements of UL Standards Nos.467 and 869 pertaining to electrical grounding and bonding.
4. NEC Compliance: Comply with applicable requirements of NEC (NFPA 70) pertaining to construction and installation of electrical systems.
C. ANSI Compliance: Comply with applicable requirements of ANSI/NEMA and ANSI/EIA standards pertaining to products and installation of electrical electrical systems and equipment.

2.1 METAL CONDUIT AND TUBING

A. General: Provide metal conduit, tubing and fittings of types, grades, sizes and weights (wall thickness) for each service indicated.
1. Where types and grades are not indicated, provide proper selection determined by installer to fulfill wiring requirements, and comply with applicable portions of NEC for raceways.
B. Flexible Metal Conduit: FS EE-C-566 and UL 1. Formed from continuous length of spirally wound, interlocked zinc-coated strip steel.
C. Liquid-Tight Flexible Metal Conduit: Provide liquid-tight flexible metal conduit; construct of single strip, flexible, continuous, inter-locked, and double-wrapped steel; galvanized inside and outside; coat with liquid-tight jacket of flexible polyvinyl chloride (PVC).
D. Flexible Metal conduit Fittings: Provide conduit fittings for use with flexible steel conduit of threadless hinged clamp type.
E. Liquid-Tight Flexible Metal Conduit Fittings: FS W-F-406, Type 1, Class 3, Style G.
1. Provide cadmium plated, malleable iron fittings with compression type steel ferrule and neoprene gasket sealing rings, with insulated, or non-insulated throat.
F. Electrical Metallic Tubing (EMT): FS WW-C-563, ANSI C80.3 and UL 797.
G. EMT Fittings: Use Type 1 fittings for rain tight connections. Use Type 2 fittings for concrete tight connections. Use Type 3 fittings for miscellaneous connections.

2.2 NONMETALLIC CONDUIT

A. Electrical Plastic Conduit: Schedule 80, UL-rated, construct of polyvinyl chloride compound C-200 PVC, and UL-listed in accordance with NEC Article 347 for direct burial, or above ground use.
B. PVC Conduit and Tubing Fittings: NEMA TC 3, mate and match to conduit and tubing type material.

2.3 CONDUIT BODIES

A. Provide galvanized cast-metal conduit bodies of types, shapes and sizes as required to fulfill job requirements and NEC require-ments.

2.4 CONNECTION MATERIALS AND COMPONENTS

A. General: For each electrical connection indicated, provide complete assembly of materials, including but not necessarily limited to, pressure connectors, terminals (lugs), electrical insulating tape, electrical solder, electrical soldering flux, heat-shrinkable insulating tub-ing, cable ties, solderless wirenuts, and other items and accessories as needed to complete splices and terminations of types indicated.

2.5 WIRES, CABLES, AND CONNECTORS

A. Wires/Cables: Unless otherwise indicated, provide wires/cables (conductors) for electrical connections which match, including sizes and ratings, of wires/cables which are supplying electrical power. Reduced size ground conductors are not allowed unless expressly permitted on the drawings or in the specification.
1. Provide copper conductors with conductivity of not less than 98 percent at 20°C (68°F).
2. Conductors shall be copper THWN, THHN, OR XHHW unless otherwise indicated.

2.6 OUTLET BOXES AND COVERS

A. UL 514, cadmium— or zinc-coated if of ferrous metal.

2.7 RECEPTACLES:

A. General: NEMA 5-20R, specification grade, grounding type.
1. Bodies shall be ivory thermosetting plastic supported by a metal mounting strap.
2. Connect grounding pole to the mounting strap.
B. Weatherproof Receptacles: Provide in a cast metal box with a gasketed, weatherproof, cover plate and a gasketed cap over each receptacle opening. Receptacle cover shall provide weather protection even with a plug inserted into the receptacle body as required by recent UL changes.
C. Ground Fault Circuit Interrupter Receptacles: UL 943, and shall be duplex type for mounting in a standard outlet box. The device shall be capable of detecting a current leak of 5 milliamperes. The device shall be NEMA 5-20R.



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Montana Fish & Wildlife @ Parks

TRAVELER'S REST STATE PARK
PARKING IMPROVEMENTS

INSTALLATION

3.1 INSPECTION

A. Examine areas and conditions under which raceways are to be installed, and substrate which will support raceways. Notify the Owner in writing of conditions detrimental to proper completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION

- A. General: Install raceways as indicated; in accordance with manufacturer's written installation instructions, and in compliance with NEC, and NECA's "Standards of Installation."
1. Install units plumb and level, and maintain manufacturer's recommended clearances.
- B. Coordinate with other work including wires/cables, boxes, and panel work, as necessary to interface installation of electrical raceways and components with other work.
- C. Wiring Methods: shall be insulated conductors installed in EMT conduit in the building, Schedule 80 PVC conduit below grade, and direct bury quadraplex aluminum mobile home service cable where indicated, except where specifically indicated or specified otherwise, or required by NFPA 70 to be installed otherwise.

3.3 INSTALLATION OF CONDUITS

- A. General: Installed concealed conduits in new construction work, either in walls, under or penetrating slabs, or above hung ceilings.
1. Mechanically fasten together metal conduits, enclosures, and raceways for conductors to form continuous electrical conductor. Connect to electrical boxes, fittings and cabinets to provide electrical continuity and firm mechanical assembly.
- B. Conduit Installation: Follow minimum requirements in other areas as follows:
1. Cut conduits straight, properly ream, and cut threads for heavy wall conduit deep and clean.
2. Field-bend conduit with benders designed for purpose so as not to distort nor vary internal diameter.
3. Size conduits to meet NEC, except no conduit smaller than 3/4 inch shall penetrate concrete or masonry.
4. Fasten conduit terminations in sheet metal enclosures by 2 locknuts, and terminate with bushing. Install locknuts inside and outside enclosure.
- C. Non-Metallic Conduit: Make solvent cemented joints in accordance with recommendation of manufacturer.

3.4 INSTALLATION OF ELECTRICAL CONNECTIONS

- A. Coordinate with other work, including wires/cables, raceway and equipment installation, as necessary to properly interface installation of electrical connections for equipment with other work.
- B. Connect electrical power supply conductors to equipment conductors in accordance with equipment manufacturer's written instructions and wiring diagrams.
1. Mate and match conductors of electrical connections for proper interface between electrical power supplies and installed equipment.
- C. Cover splices with electrical insulating material equivalent to, or of greater insulation resistivity rating, than electrical insulation rating of those conductors being spliced.
- D. Prepare cables and wires, by cutting and stripping covering armor, jacket, and insulation properly to ensure uniform and neat appearance where cables and wires are terminated.
- E. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturers published torque tightening values for equipment connectors.
1. Accomplish tightening by utilizing proper torquing tools, including torque screwdriver, beam-type torque wrench, and ratchet wrench with adjustable torque settings.
2. Where manufacturer's torquing requirements are not available, tighten connectors and terminals to comply with torquing values contained in UL's Standard 486A.

3.5 BOXES, OUTLETS, AND SUPPORTS

- A. Provide boxes in the wiring or raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures.
1. Each box shall have the volume required by NFPA 70 for the number of conductors enclosed in the box.

3.6 MOUNTING HEIGHTS

- A. General: Mount panelboards, circuit breakers, and disconnecting switches so the height of the operating handle at its highest position will not exceed 78 inches from the floor.

3.7 SPLICES

- A. Make splices in accessible locations. Make splices in conductors No. 10 AWG and smaller with an insulated pressure type connector. Make splices in conductors No. 8 AWG and larger with a solderless connector and cover with an insulation material equivalent to the conductor insulation.

3.8 INSTALLATION OF ELECTRICAL GROUNDING

- A. General: Install electrical grounding systems where shown, in accordance with applicable portions of NEC, with NECA's "Standard of Installation," and in accordance with recognized industry practices to ensure that products comply with requirements and serve intended functions. Grounding includes but is not limited to:
- GROUND ALL EQUIPMENT
- GROUND TO GROUND ROD
- B. Ground all exposed non-current-carrying metallic parts of electrical equipment, metallic raceway systems, grounding conductor in nonmetallic raceways, grounding conductor of nonmetallic sheathed cables, and neutral conductor of wiring systems.
- C. Make ground connection to driven ground rods at each light pole. Weld grounding conductors to underground grounding rods or electrodes or use ground clamps approved for underground connections.
- D. Install clamp-on connectors only on thoroughly cleaned metal contact surfaces, to ensure electrical conductivity and circuit integrity.

3.9 GROUNDING CONDUCTOR

- A. Provide an insulated, green-colored equipment ground consisting of the same size and type conductor as the circuit hot conductor for all feeder and branch circuits.
- B. This conductor shall be separate from the electrical system neutral conductor.
- C. Run a separate ground wire for each circuit even if several circuits share the same conduit. In no case shall the ground conductor be used in common for several circuits.

3.10 TESTS

- A. Carry out all normal testing and operational checks to assure a complete, safe, and reliable system
- B. Devices Subject to Manual Operation: Each device subject to manual operation shall be operated at least five times, demonstrating satisfactory operation each time.
- C. Circuit all branch circuits as shown, connect to phase and circuit number indicated. Circuit changes shall have prior approval of the Owner.
- D. Correct any discrepancies found as a result of the above tests including replacement of conductors, splices, re-connecting loads, changing phases, installing additional ground rods, etc.

SPECIAL REQUIREMENTS

4.1 FIRE SEPARATION PENETRATION - HOLES

- A. Electrical items larger than a 4-inch nominal pipe or 16 square inches in overall cross sectional area passing entirely through both protective membranes of bearing walls required to have a fire-resistance rating and walls requiring protected openings, shall be protected with through-penetration fire stops suitable for the method of penetration.
- B. Electrical items smaller than a 4-inch nominal pipe or 16 square inches in overall cross sectional area passing entirely through both protective membranes of bearing walls required to have a fire-resistive rating and walls requiring protected openings, shall have the annular space between the penetrating items and the wall assembly being penetrated filled with a material which will prevent the passage of flame and hot gasses for a time period equal to the fire-resistance rating of the membrane.

4.2 FIRE SEPARATION PENETRATION - BOXES

- A. Steel electrical boxes in fire-resistive walls and partitions may not exceed 16 square inches in area, provided the aggregate area of such openings is not more than 100 square inches for any 100 square feet of wall or partition area.
- B. Outlet boxes on opposite sides of walls and partitions shall be separated by a horizontal distance of at least 24 inches.

4.3 FIRE STOP

- A. Where wall-protective membranes are penetrated by other materials or where larger openings are required than permitted above, the penetrating items shall be protected with membrane-penetration fire stops suitable for the methods of penetration, or installed in accordance with the installation instructions of their listing for such use.

SUBMITTALS

5.1 General contractor is responsible to coordinate project requirements involving more than one trade, is responsible to coordinate between trades and equipment suppliers, is responsible for performance of subcontractors to verify that equipment delivered to the project site for installation is in compliance with project plans and specifications, and must verify that such equipment will properly interface with equipment specified by other trades for installation and use on the project.

5.2 For the purpose of meeting those responsibilities, General contractor

- A. shall review all submittals from sub contractors;
- B. shall verify compliance of those submittals with project plans and specifications; and
- C. shall verify coordination of equipment identified in those submittals with equipment and/or work of other trades before forwarding submittals to project engineer for review. Evidence of the General contractor's review and verification of the above requirements will be provided with submittals forwarded for review.

CATALOG SHEET NOTES

6.1 GENERAL

Catalog sheets are included in this drawing set which show major material items required for the project.

Specific manufacturers have been identified, but equivalent material items are welcome, even for specialized applications.

6.2 APPROVALS

If material items other than those indicated are to be provided, prior approval from the Contracting Officer/Contract Administrator/Engineer is required. Requests for prior approval shall be made at least 10 days before bid opening.

Prior approval shall not be required for material items which a consensus of manufacturers would agree to be of equivalent quality and performance.

6.3 SUBSTITUTIONS

Material items that cannot have substitutions or equivalents will be so marked.

6.4 SUMMARY

Catalog sheets have been included so that the bidder can have a better understanding of the material item requirements.



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